



FRIDAY, NOV. 13.

CONTENTS.

ILLUSTRATIONS:	PAGE.	GENERAL NEWS:	PAGE.
Disadvantages of Mixed Un-		Locomotive Building.....	806
locking Gears for Vertical		Car Building.....	806
Plane Couplers.....	794	Bridge Building.....	806
Compound Passenger Loco-		Meetings and Announce-	
otive with Wooten		ments.....	806
Boiler.....	796	Personal.....	807
Vall's Boiler Tube Expand-		Elections and Appointments	807
ing Machine.....	797	Railroad Construction.....	808
Fargent Flexible Brake Shoes		General Railroad News.....	809
Hanger and Congdon		Traffic.....	810
Guide Pin.....	798	MISCELLANEOUS:	
New McElroy Commingler		Technical.....	804
for Car Heating.....	799	The Scrap Heap.....	805
CONTRIBUTIONS:		National Association of Car	
A Shallow Bridge Floor.....	798	Service Managers.....	795
Tunnel Ventilation.....	798	Compound Locomotives on	
Wear of Locomotive Tires.....	798	the East Tennessee, Vir-	
The Weakness of Permis-		ginia & Georgia R. R.....	796
sive Block Signaling.....	798	Government Railroads in	
EDITORIALS:		Summary.....	796
Year's Growth of Traffic		Official Report of Casualties	
and Earnings in the		on Railroads for the Year	
United States.....	800	Ending June 30, 1890.....	797
"The Flagging Absurdity"		Monro Robinson.....	797
The Economical Limits of		Commissioners' Hearing	
Steam Pressures.....	801	on Proposed Legislation	
Annual Reports.....	802	Concerning Safety Appli-	
EDITORIAL NOTES.....	800-808	cances.....	798
NEW PUBLICATIONS.....	808	Treatment of Waters Used	
TRADE CATALOGUES.....	808	in Locomotives to Prevent	
		Incrustation.....	808
		The Electric Headlight.....	808
		The Most Popular Lie of the	
		Season.....	808

Contributions.

A Shallow Bridge Floor.

Office of the Chief Engineer,
Canadian Pacific Railway,
MONTREAL, NOV. 5, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your issue of Oct. 30 contains an article on the shallow bridge floor of the 105 ft., double track, through, skew span of the C. & W. I. B. Ry., near Chicago. This span was originally designed and contracted for with 49½ in. high floorbeams built into posts, and 45½ in. high (built in) stringers, ties on top of the latter. After the iron-work was partly manufactured at Niagara Bridge Works, Buffalo, the Illinois Canal Commissioners insisted on additional headroom. The close proximity of the crossing of the double track main line of the Chicago & Alton Railway did not permit sufficient change of grade, necessitating the change of design, as partially shown and described in your article. The depth of the floor was reduced to a minimum, with special reference to using nearly all of the original materials, necessitating 13 ft. 10 in. as the clear width for each track.

I may state that the stringers have a riveted bracketed transverse bracing. The end top struts required a novel design; they are laid horizontal, and form part of the bottom flange of the combined upper floorbeam and top strut at truss suspenders. These horizontal struts are knee-braced, and bracketed to central floorbeam suspenders and to end posts and to the above-named upper floorbeams at various points. The most severe and varied tests were made in the presence of the railroad officers to their entire satisfaction. The span showed remarkable stiffness in all directions. Its seeming odd appearance requires me, as the designer and contractor of this span, to give the above explanations. These upper floorbeams for certain kinds of multiple track bridges may have some advantages.

This bridge was built ten years ago, and on looking over the working drawings, I think its design the first partial pin and riveted double-track span with a perfectly rigid floor system. The live loads given in your article are for each track. I assumed these loads greatly in excess, to meet any future requirements.

MAX A. ZUERCHER,
Asst. Engineer, C. P. R.

Tunnel Ventilation.

NEW YORK, NOV. 9, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice that you do not reply to the somewhat remarkable suggestion made by your correspondent A. B. in the criticism by him on your editorial on tunnel ventilation. Possibly you did not think it worth while, but as his suggestion of "movable partitions" at the stations has some plausibility I would like to call attention to the great impracticability of such a scheme.

If practicable it would solve the ventilation question very neatly, inasmuch as the train could be made to do the work of changing the tunnel air which would otherwise have to be done by fans. It must be borne in mind, however, that in so doing increased work would be thrown on the motive power of the road, theoretically, if not practically, offsetting the saving of power by omitting the fans.

When A. B. speaks of a "movable partition between the two springs," that is, the air inlet and the air outlet at a station, the arrangement he proposes is not clearly outlined. It would not be practicable to place this partition or gate in the station space for the reason that it

would have to cross the platform as well as the tracks. If placed at either end of the station it would leave the platform and approaches exposed to violent drafts produced by the air pushed ahead of the train or drawn after it. To avoid this it would seem necessary to use a gate at each end, or with separate tunnels for each track as proposed by A. B., eight gates at each station.

Supposing, however, that four gates per station would suffice, we then have 208 gates across the tracks for a line 13 miles long with stations one-quarter mile apart. For each round trip of a train 104 gates must be opened ahead of it. Bear in mind too that these gates, to serve their purpose effectually must open very close ahead of a train; otherwise, they would be very nearly useless with the stations so near together as is proposed. Bear in mind, also, that each gate to be operated safely must have its distance signal at such distance that the train can be brought up before reaching the gate if the distance signal is against it. To reconcile the last two conditions would be very difficult at any rate.

If now we assume an average headway of two minutes on each track for 14 hours per day we get 840 trains per day making the round trip, each of which opens as above 104 gates, or a total of 87,330 gate openings per day on one line from the Battery to the Harlem River; these openings to be made close in the face of trains. Would not this be rather an appalling condition of operation?

W. HOWARD WHITE.

Wear of Locomotive Tires.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In a recent number of the *Railroad Gazette* the statement is made that a certain road saved \$200 per engine per year in repairs upon engines which were equipped with a certain make of tires. It was not mentioned in the article in question whether the tires referred to were on the drivers alone or on the truck and tank wheels as well, but the inference is that the driving tires alone were meant. When we consider that a set of American tires of improved make can be furnished at not over \$100 per set of four, it would seem as if the statement quoted would need modification. It is possible that the fact of an engine having to come into the shop a little oftener to have the tires turned affords an opportunity for doing work which might otherwise be delayed, and the sum of such additional work may, during the life of an engine, average a material sum a year over engines using a harder tire. Is this, however, a fair argument? Was it the best practice when an engine was in the shop merely for turning the tires to allow the Master Mechanic to make other repairs unless absolutely necessary?

It seems that master mechanics sometimes lose sight of what might be termed the commercial feature of their work, and are not careful to see whether the desired end always warrants a certain outlay in some cases, and in others they neglect to make certain repairs or improvements, on account of the present expense, not thinking sufficiently of what the possible saving may be during a series of years. On at least one road that I know of, care is taken when a division man calls for repairs at the main shops for one of his engines, to do no more than he calls for, so engines may often be sent in to have their tires turned, or even to have a new set, without a lot of miscellaneous work being charged up to them.

It is an interesting question in this connection as to how far we can afford to pay any higher price for tires which do better work or give longer service. To start this examination, let us suppose that we have upon an eight-wheeled engine a set of 56-in.-centre tires. A set of good American tires will run, say 600,000 miles, or ten years. In this time they will average four turnings. The cost to the road in money for the application, use and removal of these tires will be all together as follows:

First cost per set.....	\$100.00
Boring and setting.....	5.00
Turning four times at \$30.....	120.00
Removing.....	8.00
	\$233.00
Credit by old tires.....	15.00
Net cost.....	\$221.00
Per year.....	22.10
Cost per year, not including first cost of tires.....	12.10

If we have a better class of tires which will give us a mileage of 25 per cent. more, or 750,000 miles for 12½ years, we would find as follows:

Cost of applying, turning and removing, less old tires.....	\$121.00
Cost per year on basis of 12½ years.....	9.76
Saving per year.....	2.34
These 2½ years would have cost, per year, on basis of the softer tire, at \$12.10 per year.....	30.25
This, added to the cost of the cheaper tires, gives us the price we can afford to pay for the better grade.....	139.25
An increased percentage in price of.....	30.25 per cent.

From the above it would seem as if we could afford to pay a little higher percentage in first cost than the absolute gain in wear mileage. There is an incidental advantage in that the engine is not in shop as often, as far as its tires are concerned, and affords less opportunity for doing miscellaneous work which is so apt to be done when an engine comes into shop for some other purpose, but which could really wait until the time arrives for a general overhauling.

I have purposely refrained from making any statement or estimate as to the actual comparative wear or freedom from breakages of high or low priced tires, but have confined myself to the case in point, which was to investigate, if possible, in regard to the amount we would be justified in paying for goods giving 25 per cent. more service.

H.

The Weakness of Permissive Block Signaling.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your readers, and railroad officers generally, are to be congratulated upon the appearance of the description of the block system, with its cost and results, as published in your paper of Oct. 16 in the report of the American Society of Railroad Superintendents. The West Shore road deserves credit for setting a good example before other and more prosperous roads, and Mr. Wattson, who gives this description, has taken a step that should be followed by others. I find that a principal cause of the lethargy existing among railroad officers on this subject is the lack of specific information about individual roads, such as Mr. Wattson gives. Every one knows that a rich road like the Pennsylvania can build towers every mile or two, and keep them manned day and night; and it is equally plain that hundreds of poor roads cannot adopt such an expensive safeguard. Actual examples, on roads working under various circumstances, will tend to dispel the dense indifference which results from idly resting on these extreme views and therefore will be of decided value. Mr. Wattson shows that an imperfect method of blocking is far better than none, and that such a method can be cheaply established and maintained; and he further demonstrated quite plainly that by an increase of the number of signal stations so as to be able to use the positive block always, entire immunity from collisions could be secured. I regret that he did not come out more strongly on this point.

It must not be forgotten that luck counts for a good deal over short periods, and that with the small number of trains for which the blocking system was suspended during the period for which statistics are given (that is, they were allowed to follow other trains into the block as if no such system existed) we need not expect many collisions.

The number of trains which were allowed to take the risks of collision amounted to only a little more than five per cent. of the traffic for the month of which statistics are reported; 95 per cent. of the trains were insured against any possibility of collision. This other five per cent., according to the doctrine of chance "and other such branches of learning," should be able to go on for a long time without disaster; but also, according to that fatal doctrine, the disaster will finally be due; and after it has come will be the time when it can be safely calculated whether it was an economical measure to adopt the permissive block for even so small a proportion of the trains, or not. Suppose one of the passenger trains so trusted to luck should —; we will suspend conjecture, which often goes far wrong.

Evidently Mr. Wattson thinks there is something magical in the effect of the clearance paper which the engineer of the following train is required to sign. It may at first have some effect upon his imagination to render him more careful; it would be as difficult to prove the negative as to decide in the affirmative; but about the only advantage the system of clearance papers has over the use of the green signal is that it must necessarily delay the train at the signal station longer than if the green signal only were employed. It may be doubted whether the rule which holds the following train responsible for a collision with the preceding one, must not operate to lessen the responsibility of the forward one and make the flagging less prompt than it otherwise would be, if that can be possible. Flagging has been the miserable, untrustworthy dependence of poor and cheap railroading from the beginning; at first from inexperience in any better methods, and afterward from the reluctance of directors to expend money to insure safety.

But, of course operating superintendents cannot often attain to the best means, and I would not detract from the high credit they deserve, when they achieve, as in this case on the West Shore Railroad, excellent results with imperfect means—it is against the delusion, that because immunity from collision has resulted from such means during so short a period, it will continue forever, that I feel bound to protest.

The ideal system, which will insure the maximum possible protection and which is the only one which any road of large traffic should adopt, is the positive block system by day and by night, doing away with the flagging absurdity altogether.

The semaphore signal at the block station, as at every other place, should tell the engineer to stop, or else it should warrant him that the road is clear for him to the next signal. With the multiplication of high speed trains upon our roads this system must prevail; such trains must not be delayed to sign papers, nor should the engineer be distracted from the very responsible duty he has to perform of running the train properly and safely.

E. N. P.

Disadvantages of Mixed Unlocking Gear, or Vertical Plane Couplers.

There is one problem which the Master Car Builders' Association will have to face before another two years have passed. It relates to the unlocking devices for the vertical plane coupler. It is axiomatic that all unlocking devices for car couplers should be in the same place on cars of the same type and be operated in the same general way. This is so for several reasons.

The ordinary run of trainmen cannot be expected to understand the construction of different car couplers or the methods of operation of the locks. They are a rough

class, and recklessness is their chief virtue. This is more particularly true on the Western roads, where the trainmen lead a rough and wandering life, often changing from one road to another several times in a few months. In busy times any sort of a man who can turn a brake wheel is taken into service. Not infrequently men engage as trainhands in Chicago to go West and

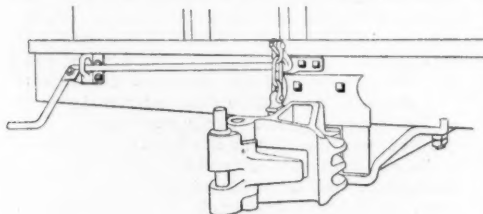


Fig. 1—Janney.

never return, using the position merely to enable them to work their passage over the road.

Cars have to be coupled and uncoupled in the dark and the trainmen have not the assistance of their eyes, as in the daytime, to show them the correct way of moving the unlocking mechanism. The ordinary lantern carried gives but little assistance. A switchman may be expected to know that there is a handle somewhere on the side of the car for lifting the locking pin, but there is no way of indicating to him in the dark which way it should work to lift the lock or to drop it, or how to hold it up when it is lifted in order that the coupler may remain unlocked. Perhaps he might, by trying a half dozen ways, succeed in unlocking the coupler; but, supposing the lock is defective, he tries every

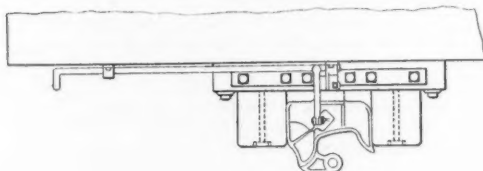


Fig. 2—Standard.

method that he has ever run across, and the coupler fails to unlock. Fearing that he has made some mistake in some of the trials, he pushes, pulls and twists, not knowing what to do, but hoping that every new movement will produce the desired result. Finally, he supposes that something is the matter, and proceeds to lift the lock with his fingers. In this way there is a loss of time in switching and a continual temptation to go between cars to see what the difficulty is with the lock, whereas if the unlocking gears were alike one could tell at once if the lock was defective.

The muddled state in which the unlocking mechanisms are can only be realized by those who make a study of

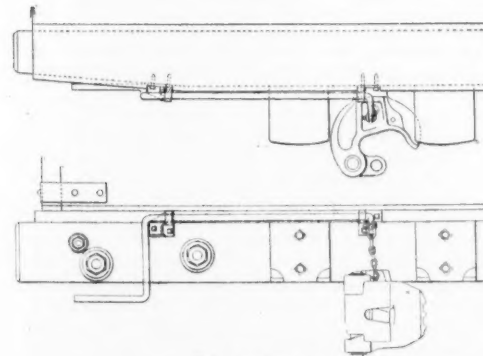


Fig. 3—Gould.

couplers and who are intimately familiar with the different designs. There is scarcely a coupler man, no matter how well he may be acquainted with his own designs and generally with the designs of others, who can walk through the freight yards of any large western city in the dark and uncouple the different couplers to be found there without making an error. Of course, in the daylight, a mechanic can tell by the construction whether the handle has to be rotated or pushed to perform the unlocking. Some handles rotate to the right, others to the left. Some are kept in an unlocked position by pulling, others by pushing, and still others have no means provided for holding them unlocked. Others move when the knuckle opens, and still others remain stationary. This is a bad state of affairs for a standard

coupler which is intended to facilitate coupling and to remove the need for trainmen to go between the cars.

Aside from the loss of safety and loss of time brought about by lack of uniformity in design of detail, there is

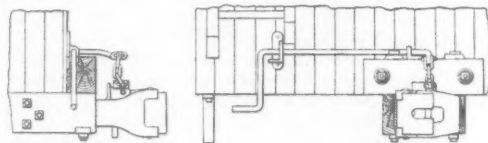


Fig. 4—Hinson No. 1.

considerable additional expense attached to renewals of draw bars and in repair. For instance, several railroad companies are buying three or four different kinds of draw bars. They put these on indiscriminately. Sometimes, also, on foreign cars, it is admissible to use any good type of vertical plane draw bar which is at hand for repairs, and it is generally admissible to use any bar where the car is given an M. C. B. defect card for a wrong bar. If the unlocking gear is the same for the coupler that is substituted, there is little trouble in making the repairs; but supposing one gear differs materially from the other, then the old handles, brackets, chains and all, have to be removed and a

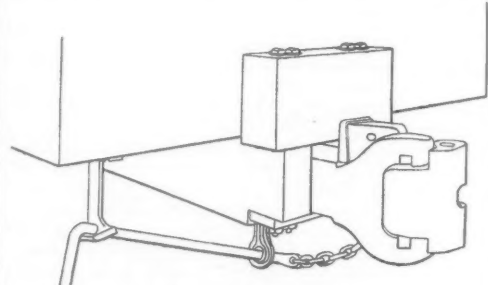


Fig. 5—Hinson No. 2.

proper one substituted, thus causing more than double the delay and expense for labor. When the gears for the couplers which have been substituted are found to be in stock it is not uncommon to have to bend the handles to a different angle or lengthen or shorten them; and roads that are willing to receive any M. C. B. coupler are not willing to have cars injured by pulling off one unlocking gear and putting on another every time a coupler is changed. So at the present time the situation is not a satisfactory one. There is no uniformity in the locking and unlocking gear which will enable

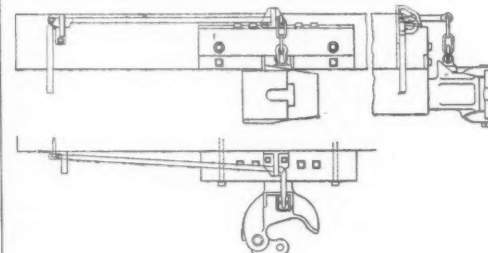


Fig. 6—Chicago No. 1.

one coupler to be substituted for another without requiring changes to be made in that gear, and there is no uniformity in the method of operating such as is essential in order to obtain the best results with the vertical plane coupler.

In order to emphasize these points more forcibly, we have prepared the table and diagrams showing the different kinds of unlocking gears that are now on the market. We have omitted some because we could not get the desired information. Some manufacturers state that

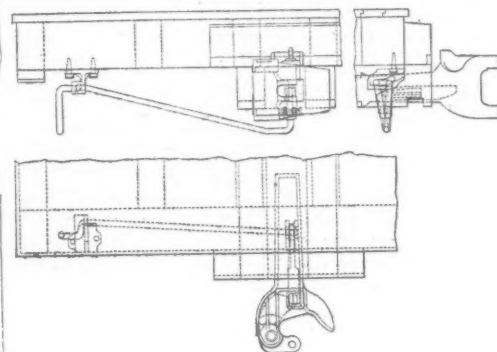


Fig. 7—Chicago No. 2.

they are not satisfied with the unlocking gear they have been using and are designing new ones. We cannot show all of the differences, such as those in the sizes of the pins, chains, clevises, brackets, and rods, which are different in many cases. There is a lack of interchangeability in several minor points which can easily be seen by looking at the actual gears on the cars in service,

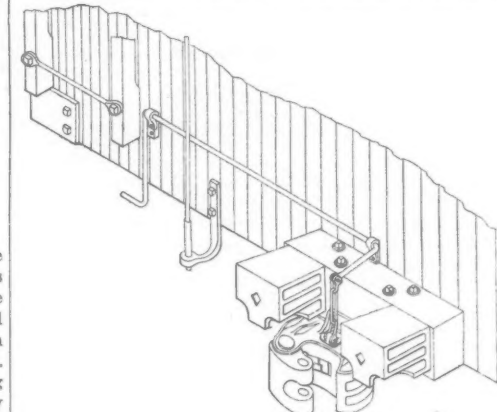


Fig. 8—Thurmond.

but which cannot be appreciated by an examination of the drawings herewith. The endeavor now is only to show the differences in action, and how difficult it is for even a well posted coupler expert to operate the different devices in the dark.

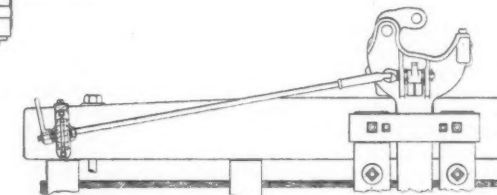


Fig. 9—Van Dorston (bottom view).

There are still other differences than those which appear in what is stated above. For instance, some of the locks lift more than others, so that, in case of repairs, while the lifting chain may come in the proper place

Figure number.	Name of coupler.	Location of lock.*	How lock is moved to unlock.	Unlocks from above or below.	How lock is held in unlocked position.	How handle at side of car is related to unlock.	Connection between unlocking shaft and lock.	Can or cannot be unlocked by a shaft on car, with variable position of lifting arm and variable step for holding shaft in unlocked position.	REMARKS.
1	Janney No. 1.	Left of centre.	Lifted.	Above.	Pushing	Below to right.	Chain.	Can.	As now sold.
2	Janney No. 2.	"	"	"	"	"	"	"	Old style.
3	Standard.	Centre.	"	"	"	"	No connection.	"	As now sold.
4	Gould.	"	"	"	"	"	Chain.	"	Opens by gravity.
5	Hinson No. 1.	"	"	"	"	"	"	"	Latest form.
6	Hinson No. 2.	"	Revolved.	Below.	"	"	"	"	Old style.
7	Chicago No. 1.	Right of centre.	Lifted.	Above.	"	"	"	"	As now used.
8	Chicago No. 2.	Centre.	"	"	"	"	No connection.	"	"
9	Thurmond.	"	"	"	"	"	Chain.	"	Has adjustable clevis in chain.
10	Van Dorston.	"	Revolved.	Below.	"	Top to left.	Universal joint.	Cannot.	Now being redesigned.
11	Trojan.	At side.	"	"	"	Below to right.	"	"	Pushed to open knuckle.
12	Drexel.	In end of knuckle.	Pulled.	"	"	Pulled.	"	"	Now being modified.
13	Smillie.	Centre.	Lifted.	Above.	Pushing	Bottom to left.	Clevis.	Can.	Pulled to open knuckle. Shaft on right of car instead of left.
14	Eureka.	Centre.	Revolved.	At side.	"	"	"	"	"
15	Union.	Left of centre.	Lifted.	Above.	"	"	"	"	"
16	Williams.	Left of centre.	"	"	"	"	"	"	"
17	Robert.	Right of centre.	"	"	"	"	"	"	"
18	St. Louis.	Centre.	"	"	"	Bottom to right.	Chain.	Can.	Uses several styles.
19	Buckeye.	Right of centre.	"	"	"	"	"	"	Latest form.
20	California.	Left of centre.	"	"	"	"	"	"	"

*NOTE.—Generally those locks that are on the same side can be lifted by the same gear if they are arranged to lift from the top, but owing to the variation in the height of the lift they can seldom be held in the unlocked position, by any other lifting gear than that for which the lock was designed.

† Looking at end of car.

for a different coupler, yet, owing to the amount of difference in the lift of the lock, the coupler cannot be held in an unlocked position when desired.

From all this it will be seen that in order to have a satisfactory, uniform standard unlocking gear it will be necessary to arrange the horizontal arm on the lifting shaft in the same position laterally, or else make it adjustable

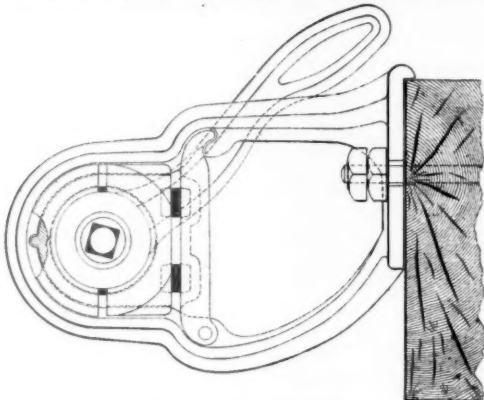


Fig. 9(a)—Van Dorston.

on the shaft. Also, the locking pins must have the same amount of lift or some provision made in the catch which holds up the arm of the shaft so that different amounts of lift will be provided for. There are some small variations which can be accommodated by using a liberal length of chain. Of course, it is not best generally to stop improvement by the adoption of a standard until

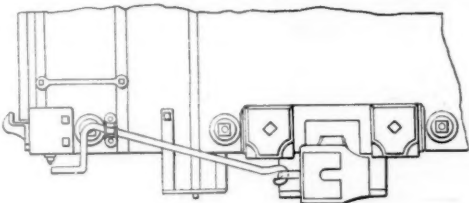


Fig. 10—Trojan.

there is enough experience to tell which is practically the best scheme to use, but in this case the majority of the devices illustrated are nearly of one general type and are alike in general features, hence a practicable alteration would perhaps be all that is necessary to make the majority of them so near alike that one bar could be sub-

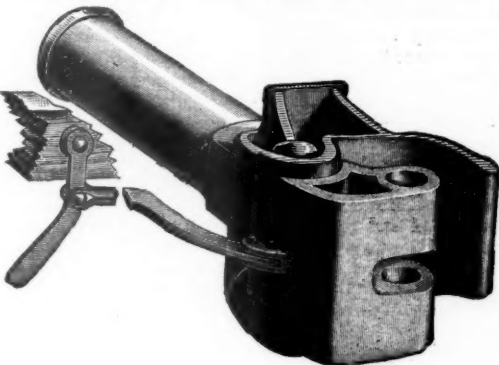


Fig. 11—Drexel.

stituted for another without requiring a change in the unlocking gear.

Double Drawbridge Driven by a Gas Engine.

The new drawbridge which the Chicago & Northwestern has put in across the river at Milwaukee will help out considerably in handling the traffic at that point. The bridge is situated between the two yards, and is in con-

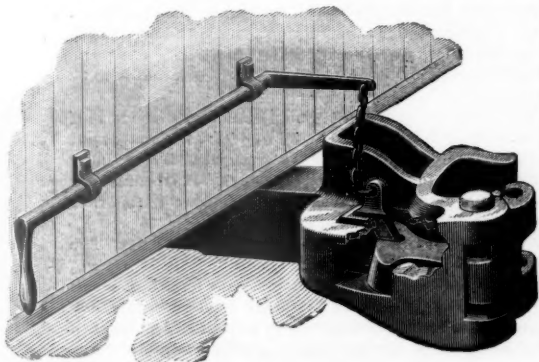


Fig. 15—Williams.

stant use, not only by the main line trains, but also as part of a switching track by the yard engines working back and forth in kicking cars to the various tracks. The old single bridge was a constant block and hindrance to the move-

ment of trains, and the benefits of this double track draw will be felt from the start. The abutments and center pier are well built, of large cut stone and are brought up but a few feet above the water level. The turntable is

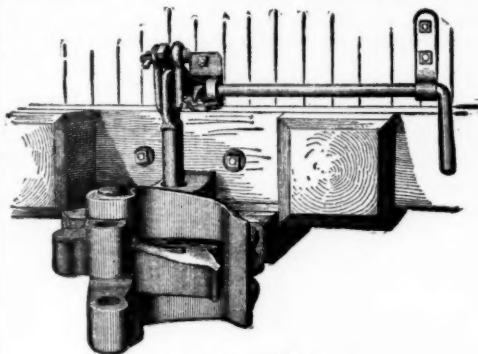


Fig. 12—Smillie.

rim bearing, with the lower girders built in the shape of a rectangle. The posts and diagonals are pin connected above and below, the posts being carried down and riveted to the plate, floor girders.

The distinctive feature of this bridge is its being operated by a gas engine, and it is, we think, in this respect the only one of its kind in this country, although this system has been used abroad. The engine room is suspended below the top chords and contains a 20-H. P. Otto gas engine connected to the shafting by friction clutches, the proportioning of the gears being so arranged that the time for opening the draw is somewhat less than one minute.

The shaft gears are supplied with ball bearing equal-



Fig. 13—Eureka.

izers for compensation of the rack, and the bevels have a Prony brake attached. The upright shaft and pinion work directly on the rack below, so that all adjustment is made in the engine room. A large tank at one corner of the engine house is kept filled with gas by means of a pipe running down to the end of the bridge, where a flexible pipe coupling connection is made with the shore pipe to the street main. Supply may be taken at any time the bridge is closed, and stored in the upper tank, thus obviating the necessity for under-water pipe connection up through the centre of the turn-table.

The one engineer operates a system of interlocked derrails and switches at either end of the draw, as well as

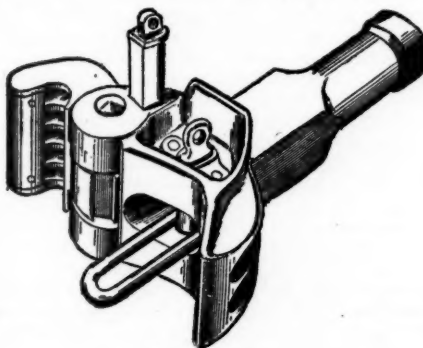


Fig. 14—Un on.

raises and lowers the end rails on the bridge. These end rails are confined by several 12-in. pieces of angle iron bolted down to the ties, and the rail ends drop into cast-iron pockets on the abutments and serve as a locking device.

The necessity for quick-acting machinery is shown from the bridge tender's sheet, which records from 150 to 170 vessels passing during 24 hours, or an average of over one each 10 minutes of the 24 hours.

The bridge and its mechanism were built principally from the designs and specifications of Mr. E. C. Carter, Principal Assistant Engineer, C. & N. W.

National Association of Car Service Managers.

The semi-annual meeting of this association (demurrage managers), which was held in New York City Oct. 28, 19 members being present, did little business except to discuss the matter of private cars on private tracks. The form of agreement printed below was submitted to the several associations without recommendation, the

views of the members being greatly at variance concerning its merits. It will be seen that the Union Tank Line desires that its cars, when not on railroad companies' tracks, shall not be charged for and that the railroads, on condition that they be released from responsibility, agree to this. Only a few roads have as yet entered into this agreement.

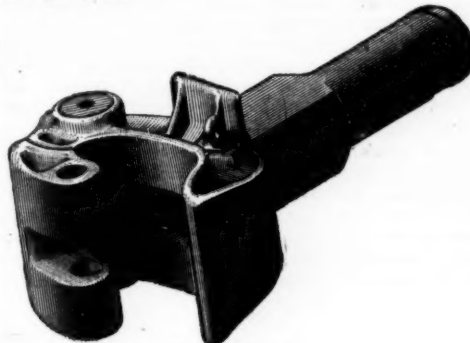


Fig. 16—Robert.

The resolution setting forth the desirability of a uniform charge of \$1 per day after 48 hours, throughout the country, which was passed last spring, was duly referred to the American Railway Association, but that body has taken no action. It appears that nearly all the demurrage associations report 95 per cent. of the cars handled as being released within 48 hours. The actual and possible complications resulting from different rates and different time allowances in different associations are

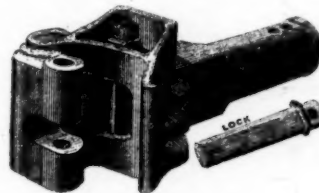


Fig. 17—St. Louis.

well known, but it has not seemed possible as yet to make any further progress toward uniformity. The meeting again recommended to the railroads that cars loaded with companies' material be included in the reports to the several managers. The next meeting will be held in Philadelphia, April 27, 1892.

Memorandum of Agreement with the Union Tank Line Company.—All cars of the Union Tank Line shall be subject to car service rules. On all cars placed on private sidings, or on sidings specially designated for use or storage of tank cars, no car service will be collected. All charges on such cars will be reported by the local

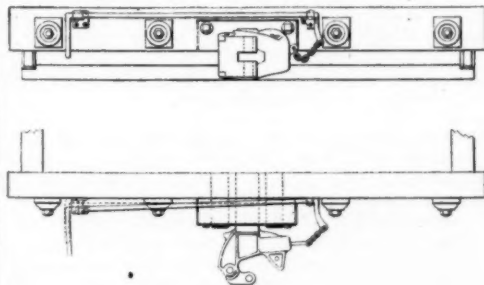


Fig. 18—Buckeye.

agent to the Manager of the Car Service Association, or to the Car Accountant of the respective roads at the close of each month, and will be by them canceled. It is understood that in all such cases the responsibility for the safety or value of such cars and their contents, on the part of the railroad company, will cease at the expiration of forty-eight (48) hours from the time the cars have been so placed on such siding, but shall be again assumed as soon as the cars are delivered back to the railroad company.

On all cars on public delivery tracks, or team tracks, so called, or tracks other than the above, where car service charges accrue under the rules of the various associ-

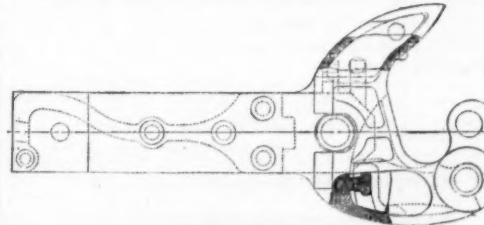


Fig. 19—California.

ations or roads, statement of the same will be rendered at the close of each month to the Union Tank Line Company, 26 Broadway, New York City, and it is understood that payments will be made promptly by said company for such charges, after a reasonable time has been allowed to investigate the same. Car service charges on public delivery tracks shall be waived only in cases where they accrue by reason of delay, caused directly or indirectly by the railroad company.

The above to govern all cars of the Union Tank Line, or cars under control of the same.

This agreement to cover all stations on the line of —.

Compound Wootten Locomotive for Passenger Service.

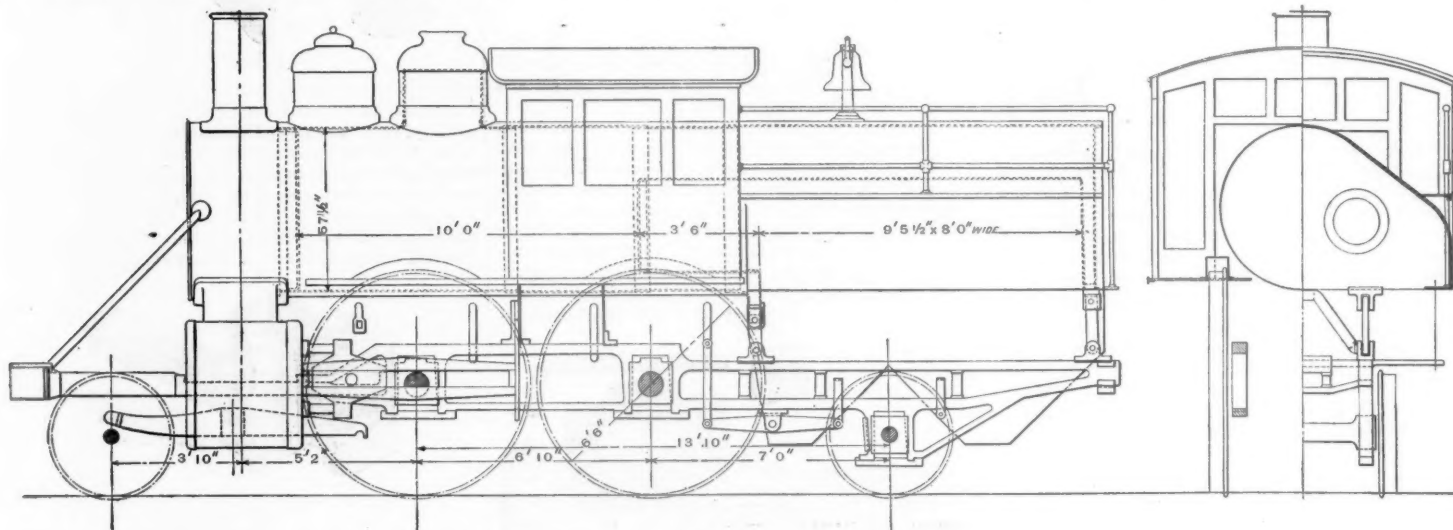
We show by the accompanying outline cut a compound locomotive having a Wootten boiler, which is being built by the Baldwin Locomotive Works for the Philadelphia & Reading. It has four drivers with a leading and trailing truck. The drivers are 6 ft. 6 in. outside diameter, and the engine is intended for fast speed. It has the Vaucain compound cylinders and a new type of crosshead which has already been illustrated in the *Railroad Gazette*. There are several novelties in the construction of the engine, which are shown by the cut. The method of carrying the axle boxes in the sub-frame at the back of the engine is a good mechanical job.

An engine such as this is admirably adapted for high speed, and all will watch the result of a trial of this engine because of several facts. The Reading has recently made one of the fastest runs ever made. It may be expected that this engine is intended to make as fast time as has been previously made. It has a piston valve

and during the first few months several slight changes were made which improved their working. The statement below shows a comparison of the compounds, compared with four engines of exactly the same type and build in every way, the same conditions as to flues, etc., for six months upon the east end of the road, and four other engines of the same style, build, and under the same conditions, for five months on the west end of the road.

Simple.					
	Engine miles.	Car miles.	Ave. cars per train.	Lbs. of coal used.	Lbs. coal per car mile.
4 engines.....	81,226	1,335,045	16.43	8,252,533	6.182
4 engines.....	61,318	1,190,786	19.11	5,977,917	5.020
Total.....	142,544	2,525,831	17.73	14,230,450	5.634

Compound.					
	Engine miles.	Car miles.	Ave. cars per train.	Lbs. of coal used.	Lbs. coal per car mile.
2 engines.....	27,682	495,050	17.88	2,454,142	4.957
2 engines.....	31,550	712,291	22.57	2,667,505	3.746
Total.....	59,232	1,207,341	20.38	5,121,647	4.242
Saving pounds of coal per car mile.....					1.392
					24.79 per cent.



COMPOUND PASSENGER LOCOMOTIVE WITH WOOTTEN BOILER.

FOR THE PHILADELPHIA & READING, BY THE BALDWIN WORKS.

which may or may not have all of the advantages of the admirable link motion used on the engine which recently made the fast time. It is a compound; and the only record of good, very fast work with a compound engine yet made is on the Northeastern Railroad of England with the Worsdell engine. Taken altogether, the results of this trial of a compound engine, with large wheels, at high speed work will be interesting at least.

Compound Locomotives on the East Tennessee, Virginia & Georgia.

The annual report of Mr. C. H. Hudson, General Manager of the E. T., V. & G., which is just issued, gives the following valuable account of the results of the use of the new compound locomotives on that road. These are two-cylinder engines built by the Schenectady Works.

"Early last year we received three compound engines, one a 10-wheel passenger engine, the other two consolidation freight engines. There were built at the same time two 10-wheel passenger engines similar in all respects except with the ordinary single expansion cylinders, and a number of consolidations exactly like the compound excepting with the single expansion cylinders. The three passenger engines were put into service at the same time—about Sept. 1—between Bristol and Knoxville. The grades here are 60 ft. to the mile, with a very large amount of 6 and 8 deg. curves. The engines were run following one another around in the trains, sometimes having the heaviest and sometimes the lightest trains. This was continued during the ten succeeding months of the year, and the results are shown below. The tests are the more valuable because the engines were of the same build, age and in every respect similar. The statement below shows a saving of 25.56 per cent. in fuel:

	Miles run.	Car miles.	Ave. cars per train.	Lbs. coal consumed.	Lbs. coal per car mile.
2 simple engines.....	107,895	564,935	5.23	6,263,654	11.066
1 compound engine.....	49,100	254,204	5.17	2,007,911	8.232
Saving pounds of coal per car mile.....					2.834
					25.56 per cent.

"The two compound consolidation engines were put into service Aug. 1, and until Jan. 31, 1891, they were upon the line between Bristol and Knoxville, the same covered by the passenger engines. The engines took their turns in the runs, changing their engineers, getting sometimes heavy and sometimes light trains. After Feb. 1 they were put upon the road between Knoxville and Chattanooga, where the grades are a little lighter, but they were run in the same way, five months, following other engines around. The use of the compounds was in a measure experimental,

"This eleven months' work shows a saving of 24.7 per cent. in the fuel used. The compounds have been found equally powerful with the simple engines, no more expensive in the way of repairs. A number of experimental trips, upon which the coal was weighed, water measured, etc., shows a slightly greater percentage of saving of both fuel and water. It is believed, however, that the actual service of the engines for one year is a much more valuable test than any single experimental trip. The compound principle has proved itself valuable, and it is recommended that road engines purchased in the future be of the compound type."

Government Railroads in Sumatra.

In the July number of the *Revue Générale des Chemins de Fer* is an interesting description of a railroad in the Island of Sumatra, written by Mr. J. W. Post, Engineer of Way of the State Railroads of Holland, and Engineer of the Government Railroads in Sumatra. An abstract follows.

For a long time it has been known that there were extensive and valuable coal deposits in Sumatra, but the rough chain of volcanic mountains between these deposits and the coast rendered transportation by animals very costly, consequently limiting the output. With a view to increasing the value of these coal beds the Dutch Government appointed M. Cluysenaar to examine the ground and locate a railroad from them to the coast. In September, 1887, M. Yzerman, engineer in charge of the Government railroads of Java, who had been with the first party, was appointed to make a final location of the route recommended by Mr. Cluysenaar.

From Lounto a long détour by the way of Padang-Pandjang was necessary in order to reach the coast. An additional branch from Padang-Pandjang to Port de Kock was located.

From Lounto to Kalaban, the average grade is 1.7 per cent.; the minimum radius is 490 ft. On this section is a tunnel 2,700 ft. long. From Kalaban to Lasi, the maximum grades are 2 per cent. On these two sections adhesion mountain locomotives weighing 34 tons are used. From Lasi to Batou-tabal, the maximum grades do not exceed 0.8 per cent., and the sharpest curve has a radius of 656 ft. On this section ordinary adhesion locomotives, weighing 19½ tons are used. From Batou-tabal to Padang-Pandjang, the system is mixed, viz.; adhesion and rack road.

On the rack section the maximum grade is 5 per cent. and on the adhesion section 1.3 per cent. is the steepest grade. From Padang-Pandjang to Kaiou-tanam the mixed system is used. The maximum grade on the rack section being 7 per cent., and on the adhesion section 2.3 per cent. The minimum radius is 490 ft. The grades

on the branch from Padang-Pandjang are allowed to rise to 8 per cent. as the transportation on this part of the road will never be heavy. From Padang-Pandjang to Batou-tabal, Fort de Kock and Kaiou-tanam, gear wheel locomotives weighing 26½ tons are employed.

From Kaiou-tanam to Port Emma the maximum grade going toward the sea is 0.6 per cent., while it reaches 1.2 per cent. going from the sea. Ordinary adhesion locomotives of 19½ tons weight are used on this section.

The total length of the road is about 108 miles, of which 75.5 miles are adhesion and 32.5 miles are rack and mixed. Of this 32.5 miles of mixed track, 17.7 miles are rack in sections varying from 710 ft. down to 18 ft.

Earthwork.—Where feasible, advantage was taken of the fact that water, flowing with a considerable velocity, can carry along with it earth, gravel and stones. Water was brought in flumes, sometimes several miles long. Workmen picked and loosened the soil and the water carried it away, even to considerable distances. At the point where the material was needed, bamboo barricades were constructed, the suspended matter retained and

the water allowed to flow away. These barricades were made from 3 to 5 ft. high, and by building them one upon another, embankments from 50 to 60 ft. in height were successfully constructed. This method was found in many cases to be very economical. The deposit was well compacted by the water. The loss of earthy matter was about 25 per cent.

Bridges, etc.—On account of the crossing of many torrent courses and irrigation ditches of the rice planters a great amount of bridge masonry was required. All the bridges are of iron, forspans up to 50 ft. plate girders are used, and from 50 to 200 ft., lattice bridges have been adopted. Illustrating the frequency of bridges it is mentioned that between Kaiou-tanam and Padang-Pandjang the same river is crossed eight times. The longest bridge is between Donkon and Loubouk-along. It is 460 ft. long and consists of two spans of 164 ft. and one of 132 ft.

At the junction of the rivers Anei and Pouti is a viaduct on a grade of 6.8 per cent. It consists of an arch of 184 ft. span and three spans of 53 ft., beneath one of which a road passes. The rack on this bridge is arranged to expand freely, being fixed to a longitudinal stringer which is attached to the abutments and slides freely, with regard to the bridge, thus eliminating the influence of expansion of the different bridge members, on the rack. By the same arrangement the thrust of the locomotive loads on the rack is conveyed to the abutments, thus permitting the columns of the piers and the other uprights to be made square to the bridge, simplifying its design, construction and erection.

There are two tunnels, one already mentioned, 2,700 ft. long, which is under construction from both ends, and is being advanced at a rate of about 10 ft. per day; the other is laid out in the gorge of the Anei, and is to be 230 ft. long.

The terminal works at Port Emma are about half done. The soil is a coral bank 4 to 8 ft. thick, and is not solid enough to support heavy structures like a quay wall, but is safe for ordinary buildings. A landing pier has been constructed of iron piles well braced together and covered with a wooden floor.

Superstructure.—The gauge of the track is 3.6 ft. The rails weigh 51½ lbs. per yd. Their height is 4½ in., and width of base 3½ in. The ordinary length of a rail is 23 ft. The joints are fastened by steel angle fish plates. Ties for the ordinary way as well as for the rack road are of steel, having varying profiles, and are of the Post pattern. Their weight is 85 lbs. and their length 6 ft. 3 in. In the middle of each tie on rack section are two holes where the chair which carries the rack is fastened. This standard permanent way weighs 212 lbs. per yd., and costs, landed at Port Emma, \$3.20 per yd.,

or \$2.97 per yd. at the works in Europe. By the use of native labor from 3,000 to 5,000 ft. can be laid in a day of 10 hours.

The cogs of the rack are spaced $4\frac{1}{2}$ ins. apart; each length of rack is about 11 ft. 6 in.; the weight is 114 lbs. per yard. The joints alternate with the joints of the rail, thus securing rigidity to the structure. In order to make the gear wheels on the locomotive engage properly with the rack when passing from the ordinary to the rack road, a toothed bar is attached to the end of the fixed rack and is mounted on spiral springs. This bar depresses under pressure. The distance between the teeth on this movable bar diminishes from point to heel, assuring the proper engagement before arriving at the regular pitch. The rackway weighs 376 lbs. per yard, and costs landed at Port Emma \$9.35 per yard, or \$7.85 per yard in Europe at the works.

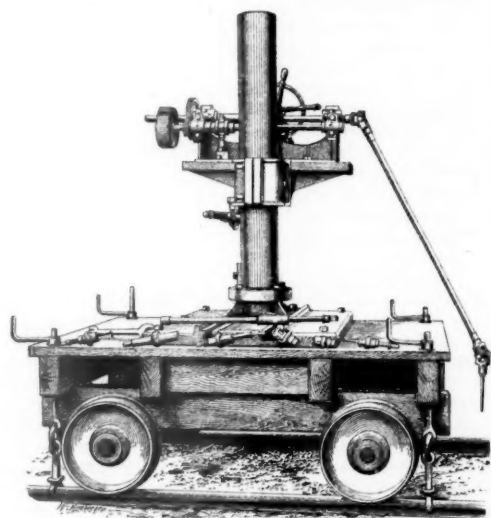
The rails at the approaches and through the tunnels are 80 lbs. per yard. This extra weight is used to allow for deterioration by rust. Curves of a radius of less than 1,300 ft. are connected to the tangents by parabolic easement curves.

Grades, radii of curves, allowances for widening gauge and the elevation of the outer rail are written on iron plates and posted alongside the tracks at the proper points.

The most important stations are at Port Emma and Lounto. The ordinary stations are very simple. There is a platform 10 ft. wide and from 150 to 200 ft. long. Small sheds are provided for shelter. It is interesting to note that for rolling stock the American bogie truck is adopted. On July 1st, 1891, the line from Poulou Ajer to Padang-Pandjang was opened to public travel, and the line from Padang-Pandjang to Fort de Kock will soon be finished and opened.

Vail's Boiler Tube Expanding Machine.

An interesting tool, designed by Mr. A. Vail, General Master Mechanic of the Western New York & Pennsylvania, is shown in the illustrations. It has a vertical column mounted on a wooden platform carried on four truck wheels. On the column is carried a crosshead



holding a mechanism which drives a universal shaft. The crosshead is raised and lowered by means of the crank shown. There is a rack on the column and a pinion with a pawl on the crosshead. Power for the machine is derived from any convenient shafting or from a stationary engine conveniently placed. Rail clamps are provided to hold the machine in position in front of the engine, and there is at the front end of the truck a centre wheel arranged to be raised and lowered, to which is attached a tongue by which the machine can be pulled to any part of the shop. The wheels are loose on the axle on one side of the truck.

When it is more convenient, this machine is driven with a raw hide rope and it is also used to tap and drill stay bolt holes, and various different tools are used in connection with the universal shaft, the action of which can be governed by the hand wheel.

As an example of the value of this machine in a locomotive shop, it is stated that 262 tubes were expanded at both ends ready for beading in five hours, which included the changing of the machine from one end of the boiler to the other. This is a successful adaption of power to two of the most tedious operations in locomotive boiler building, namely, the screw staying and the tube setting, and adds another useful tool to the large number which have been recently brought out for decreasing the cost of locomotives.

Official Report of Casualties on the Railroads of the United States for the year ending June 30, 1890.

At the hearing on safety appliances, held in New York City this week, the following statistics, made up in the office of the Interstate Commerce Commission, were presented by the chairman. The tables are to be re-

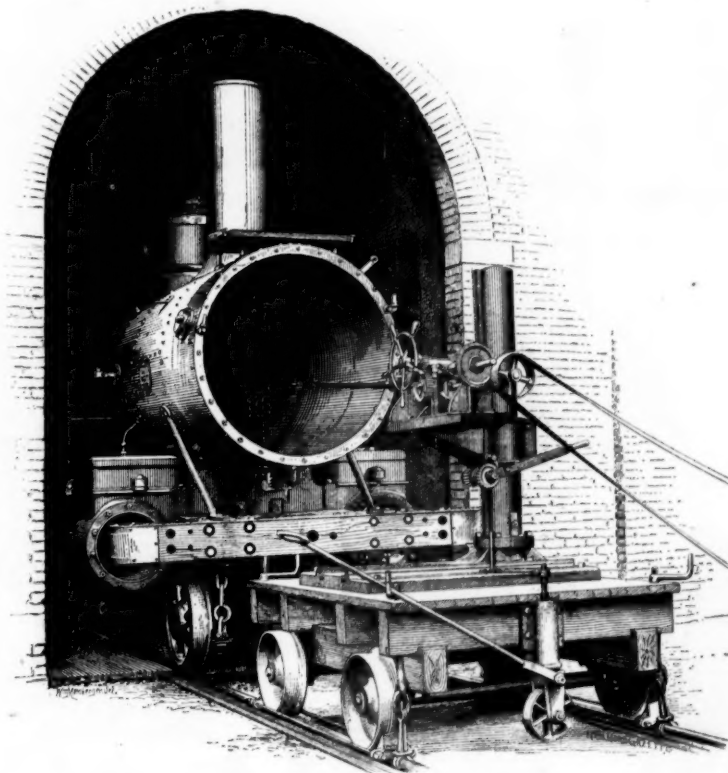
garded as advance sheets of the statistician's annual report:

TABLE 1.
Total Accidents to Persons.

	Year ending June 30, 1890.	Year ending June 30, 1889.
	Killed. Injured.	Killed. Injured.
Employees.....	2,451 22,390	1,972 20,028
Passengers.....	285 2,444	310 2,146
Other persons.....	3,584 4,200	3,541 4,135
Total.....	6,320 29,034	5,823 26,309

TABLE 2.
Accidents to Employees, Classified by Occupation of the Persons.

	Year ending June 30, 1890.	Year ending June 30, 1889.
	Killed. Injured.	Killed. Injured.
Trainmen.....	1,456 13,182	1,179 11,301
Switchmen, Flagmen and watchmen.....	234 2,299	229 2,155
Other employees.....	734 6,673	596 6,360
Unclassified.....	27 236	28 212
Total.....	2,451 22,390	1,972 20,028



VAIL'S BOILER TUBE EXPANDER.

TABLE 3.
Accidents to Persons, Classified as to Causes.

	Year ending Jan. 30, 1890.	Year ending June 30, 1889.
	Killed. Injured.	Killed. Injured.
EMPLOYEES.		
Coupling and uncoupling.....	369 7,841	300 6,757
Falling from trains and en- gines.....	557 2,348	493 2,011
Overhead obstructions.....	81 343	65 296
Collisions.....	236 1,035	167 820
Derailments.....	150 720	125 655
Other train accidents.....	154 894	189 1,016
At highway crossings.....	22 32	24 45
At stations.....	28 691	70 699
Other causes.....	749 8,250	539 7,729
Unclassified.....	27 236	28 212
Total.....	2,451 22,390	1,972 20,028
PASSENGERS.		
Collisions.....	44 526	107 445
Derailments.....	37 668	28 389
Other train accidents.....	32 201	26 247
At highway crossings.....	3 7	3 16
At stations.....	42 344	26 295
Other causes.....	127 698	120 754
Total.....	285 2,444	310 2,146
OTHER PERSONS.		
Collisions.....	26 75	37 48
Derailments.....	10 43	29 69
Other train accidents.....	349 412	522 515
At highway crossings.....	394 654	410 634
At stations.....	339 460	328 472
Other causes.....	2,139 2,523	2,215 2,397
Unclassified.....	27 33	28 212
Total.....	3,584 4,200	3,541 4,135

TABLE 4.
Summary of Table 3.

	Year ending June 30, 1890.	Year ending June 30, 1889.
	Killed. Injured.	Killed. Injured.
KIND OF ACCIDENTS.		
Coupling and uncoupling.....	369 7,841	300 6,757
Falling from trains and en- gines.....	557 2,348	493 2,011
Overhead obstructions.....	81 343	65 296
Collisions.....	306 1,035	311 1,313
Derailments.....	197 1,431	182 1,113
Other train accidents.....	535 1,507	737 1,778
At highway crossings.....	419 693	457 695
At stations.....	479 1,495	424 1,466
Other causes.....	3,315 11,471	2,874 10,880
Unclassified.....	54 269	28 212
Total.....	6,320 29,034	5,823 26,309

Moncure Robinson.

The following sketch of the life and work of this remarkable man is from the New York Sun:

Moncure Robinson, one of the pioneers of railroad construction in this country, died Nov. 10 in Philadelphia, in his 90th year. His great work was the building of the Philadelphia & Reading road.

He was designed for the law and was educated in the Gerardine Academy and William and Mary College. He was graduated at 16, the youngest graduate in the college. An expedition which the Board of Public Works of Virginia was about to send across the state to survey a line of levels from Richmond to the Ohio River determined his after profession. He volunteered to accompany this expedition without pay, and before it had done its work he was acknowledged as a leader in it.

At 19 he visited this state, and De Witt Clinton enabled him to study the construction of the Erie Canal. He became conversant with the needs and character of such work, but in studying it he became firmly convinced that railroads, which were then being talked of, would supersede transportation by canal. As chief engineer of the extension and widening of the James River Canal, which he began in this same year, he was consulted with regard to extending that work 250 miles to Covington, and gave his voice against it.

In 1825 he visited England, Wales, France and the Netherlands, and studied the great public works there, including the great dikes of Holland. He also made the

acquaintance then of George Stephenson, who was building the Liverpool & Manchester Railroad, and the other great engineers of the day.

It was upon his return in 1827 that the Canal Commissioners of Pennsylvania engaged him to build the Pottsville & Danville road to open up the anthracite coal fields. Stephen Girard furnished \$300,000 to do the first six months' work. On this work he contrived the system of inclined planes and the use of water power to carry up the loaded cars and return the empty ones which was afterward in use. In 1828 the same Commission engaged him to make the surveys for the Alleghany Portage road, to carry loaded canal boats over the Alleghany Mountains, from Hollidaysburg to Johnstown. In 1830 he built the 13 miles of road into the coal fields of Heath & Mills. Here he devised the plan, which has since been adopted in many places, of using the weight of loaded cars to haul up the empty ones on steep inclined plane roads.

In 1831 he built the Petersburg & Roanoke road and the Richmond & Petersburg road, including the long bridge over the James River at Richmond. This bridge was considered a marvel of cheapness by foreign engineers. It was 2,844 ft. long, 60 ft. above the water, and crossed in nineteen spans of from 140 to 153 ft. each. The road was poor, and the bridge was built of timber, no more than 1,500 lbs. of iron being used in it. It cost only \$117,200, or \$41 a foot. An iron bridge now stands in its place on the stone piers he built.

In 1833 he built the road up the Schuylkill, which was afterward connected with the Philadelphia & Reading by the latter's extension to Pottsville. In the following year he began the great work of his life, the Philadelphia & Reading. Here he had an opportunity to show his grasp of the knowledge of what railroads were to become. The simple rules he laid down contemplated an amount of traffic which was then thought preposterous, but the following of these rules has made the road from the beginning economical to operate. The two most important of these rules were, first, that no grade was to be so great that a locomotive of that time could not bring back to the coal regions as many empty cars as it could take full cars to the terminus; and, second, that no curve should be of less radius than 817.57 ft. In 1836 he was sent to London by President Elihu Chauncey to negotiate a loan for the road.

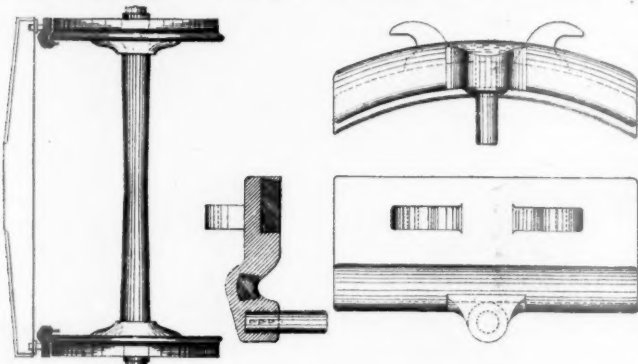
During this visit the accident to the Thames Tunnel occurred, and he was consulted regarding the further prosecution of the work. The plans of the famous Bell Rock Lighthouse were also submitted to him at that time. In 1838 he designed a successful locomotive. He was consulted upon many engineering schemes, both for this country and for foreign countries. In 1842 he was one of the United States Commission that decided upon the building of the dry docks at the Wallabout in this harbor. In 1847 he retired.

He married in 1835 and moved to Philadelphia, where he had lived ever since. His wife was Charlotte Randolph Taylor, a daughter of Bennett Taylor, Esq., of Virginia. She survives him and he leaves these children: John Moncure Robinson, of Baltimore, President of the

Seaboard Air Line Railroad; Edmund Randolph Robinson, lawyer, of this city; Dr. Beasley Robinson and Charles Moncure Robinson, also of this city, and Moncure Robinson, Mrs. Charles Chauncey, Mrs. Sydney Biddle, and Mrs. Henry Boyer, of Philadelphia.

Improved Brake Shoe Hanger and Guide Pin.

For use with the Ross shoe the mechanical engineers of the Congdon Brake Shoe Company have devised a new scheme for preventing the brake beam from being displaced laterally on the wheel. It consists of a guiding pin cast in the flange of the shoe, as shown in the cut. This device is more particularly adapted for outside brake



Congdon Brake Shoe Guide Pin.



Fig. 1.

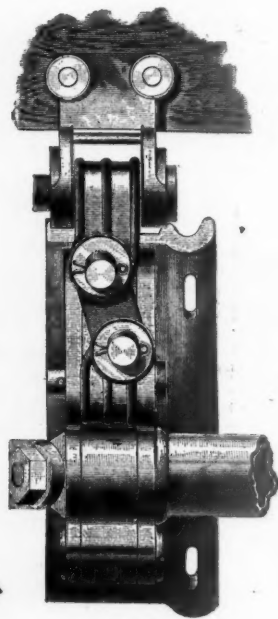


Fig. 2.

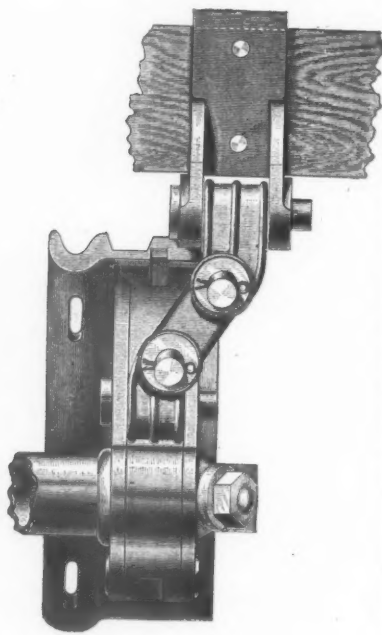


Fig. 3.

SARGENT FLEXIBLE BRAKE SHOE HANGER.

shoes, such as are hung to the body of the car, but can be used for any. It is a piece of steel rod with notches on one end and is secured to the flange of the brake shoe by being cast in position when the brake shoes are poured.

Figs. 1, 2 and 3 show the Sargent flexible brake shoe hanger as recently improved to suit the requirements of the Pullman Company. This hanger has been used extensively during the past year on Pullman cars, and with such success that an extended adoption is contemplated. It is intended to do away with the binding of the shoe and wheel flange. The beam is made to move sidewise, and the shoe always remains vertical and cannot exert any lateral pressure against the wheel. On wheels where this brake shoe hanger has been used, there is no evidence of cutting or grinding action of the shoes against the wheel flange. As shown in the accompanying cuts, the castings fit into the Pullman standard holder and brake head, and the same pins are used as with the old hanger.

This company has several other specialties designed to increase the life of brake shoes and wheels with decreased cost for braking appliances, which it expects to bring out in the near future.

Commissioners' Hearing on Proposed Legislation Concerning Safety Appliances.

The committee appointed at the last National Convention of Railroad Commissioners to formulate a bill to be presented to Congress on the subject of safety appliances on railroads met in New York City on Tuesday of this week, four members, Messrs. Crocker, of Massachusetts, Smith, of Iowa, Rogers, of New York, and King, of South Dakota, together with Secretary E. A. Moseley, being present. Commissioner Hill, of Virginia, was absent. The following parties appeared in response to the call of the committee: American Railway Association: President, H. S. Haines (Plant System); Second

Vice-President, Lucius Tuttle (N. Y., N. H. & H.) members of the Executive Committee, E. B. Thomas (N. Y., L. E. & W.) and C. W. Bradley (West Shore); members of Committee on Safety Appliances, E. T. D. Myers (R., F. & P.), C. A. Hammond (B., R. B. & L.) and Theodore N. Ely (Pennsylvania); Secretary, W. F. Allen. Master Mechanics' Association: M. N. Forney, G. W. Rhodes (C., B. & Q.), and R. C. Blackall (D. & H. C. Co.), members of special committee; Angus Sinclair, Secretary. Order of Railway Conductors and Brotherhood of Railway Trainmen: L. S. Coffin, Switchmen's Mutual Aid Association: Frank Sweeney (Grand Master), D. D. Sweeney, John A. Hall and Samuel Heberling. Brotherhood of Locomotive Engineers: James C. Currier. Yardmasters' Association: A. D. Shaw. There were also present Mr. William McWood (Grand Trunk), former President of the Master Car Builders' Association, and D. W. Sanborn, Superintendent, and J. T. Chamberlain, Master Car Builder, of the Boston & Maine.

Chairman George G. Crocker, in opening, referred to the large number of employees killed and injured in this country annually, and to the imperative necessity, as shown by the resolution under which this committee acts, for legislation looking to the cure of the evil. After stating that the committee had received from employees' organizations and others

both Colonel Haines and a number of the other speakers spoke both as representatives of the societies sending them to the meeting and as individual railroad officers, speaking from their experience or judgment in connection with their own lines. Many of the questions of the commissioners necessitated this attitude. Colonel Haines estimates, from careful inquiry, that the total number of freight cars now in service is 1,200,000, and that 200,000 of these have the M. C. B. Coupler, divided as follows:

Janney	100,000
Gould	23,000
Other forms	77,000

The country is indebted to the railroads and not to legislation for the M. C. B. coupler. The American Railway Association has adopted it as standard. While this action is not binding upon the roads, the adoption of a standard coupler by the larger roads, Colonel Haines pointed out, will have a powerful influence upon other roads, because the former will insist that cars owned by the latter and used in interchange shall be made to conform to the standard. The safety of employees is better provided for by companies here than in Europe. The present degree of perfection attained has been at the expense of costly and often disappointing experiments made by the roads. The statistics sent in by the roads are deceptive because they do not show the rapid progress now going on. All the car builders today say that practically every order for freight cars specifies the M. C. B. coupler. Probably 25,000 cars are now under construction to be equipped with this coupler.

Colonel Haines alluded to the danger that legislation might retard progress. It is not claimed that the M. C. B. coupler is perfect, and legislation prescribing rigid adherence to it might prevent improvements. The maximum capacity of all the shops manufacturing M. C. B. couplers is probably 150,000 a year. Even at 200,000 a year it will require at least five years to complete the equipment of the present stock of cars, and added to this is the expense, twenty-five million dollars. Questioned as to a reasonable limit of time, Colonel Haines was undecided, but regarded the completion of the task in five years as impossible. There is practically free competition among manufacturers of M. C. B. couplers. Mr. Ely here stated that all couplers were bought by the pound and if there is a royalty it is impossible to discover it. No known royalty is paid.

Colonel Haines in taking up the subject of brakes, said that driving wheel brakes are now approved by practically all the roads and that the equipment of engines with them, largely accomplished already, is going on rapidly. He is not prepared to say that the automatic air brake for freight trains is yet wholly satisfactory. A committee of his Association is now gathering information on that point. In answer to a question from Mr. Coffin, Colonel Haines could not say definitely as to whether greater or less economy would result from using air brakes universally on freight trains.

Mr. Forney, speaking for the Master Mechanics' Association, reviewed the history of the vertical plane coupler from its first adoption at Saratoga by the Master Car Builders in 1834. The contour lines were adopted in 1887, and the patent on these was then made practically free. But the manufacturers did not adhere to the standard, and the standard gauges have now been established. Mr. Forney detailed the difficulties resulting from varied and imperfect material, careless design, differences in minor parts, etc. Evolution in such important matters must go on for years. Immediate compulsion would result in imperfect devices. The best couplers to-day are all defective. In reply to a question Mr. Forney believed that the contour lines as now adopted would stand. Asked what was the objection to legislation compelling the adoption of these lines, he replied that it would remove the sense of responsibility which the companies now feel. The only practicable legislation he could suggest would be the establishment of an investigating body, like the British Board of Trade, to inquire as to the causes of accidents, etc., and in general to promote publicity; public sentiment would do the rest. Mr. Forney, in speaking of the powers of the Board of Trade referred to them as they existed before the recent legislation giving that Board mandatory powers. Questioned as to the expediency of a law requiring the principal roads to agree upon a uniform coupler, as the roads in the American Railway Association have ostensibly done already, and then, after securing this agreement, making the standard compulsory by law, Mr. Forney repeated his previous argument against legislation as retarding progress, etc. Asked if there would be reasonable progress without compulsory legislation, Mr. Forney said yes, provided the roads were to be watched by an investigating board, as he had suggested. The last question of the committee was then restated in this form: Suppose that the roads owning 60 per cent. of the freight cars of the country agree upon a standard coupler within one year after a law is passed requiring them to thus agree and then the Interstate Commerce Commission, or other authority, proclaims this as the legal standard; or, if the roads fail thus to agree, a technical commission be then appointed to select a standard? Mr. Forney's answer was, however, to the same intent as before.

Mr. Ely spoke briefly, saying that his road could move no faster than it is now moving even if there were a law. Air brakes are being put on all new equipment. Mr. Thomas stated that 66 per cent. of the locomotives on

a great amount of documentary information, too large to be read at this meeting, he presented a summary of the replies received from the presidents of the various railroads in answer to a circular sent out. This is condensed in tabular form below. Mr. Crocker stated that the replies in many cases were very vague and incomplete, and the figures are therefore not to be regarded as strictly accurate. It appears that the total mileage of road represented by the replies is about 125,123.

INFORMATION RECEIVED FROM RAILROADS.

Total number of freight cars	378,161
Equipped with automatic coupler	129,301
Janney	40,231
Gould	23,337
Hinson	42,081
Designated simply M. C. B.	13,279
Total M. C. B.	118,928
Safford	12,207
Others	38,955
Total specified	170,390
Apparent number having plain link and pin	808,071
Westinghouse brake, number freight cars equipped	97,238
Eames	30
Boyd	34
Other types	12,555
Total locomotives	27,159
Equipped with driving wheel brakes	17,000
Roads	Miles.
In favor of national legislation	69
In favor of voluntary action by roads	88
In favor of state legislation	2
In favor of M. C. B. type of coupler	17
In favor of other couplers	10
Believe the matter still in experimental stage	15
Express no opinion as to best means of bringing about uniformity	145
	38,986

The Atchinson, Topeka & Santa Fe and one other road are in favor of the Safford (link and pin) coupler.

Mr. Crocker also presented a summary of the statistics of casualties for the year ending June 30, 1890, which are given in another column of this paper. These figures have been compiled by the statistician of the Interstate Commerce Commission for his annual report, but are not yet to be regarded as official.

The first speaker before the committee was Colonel Haines. It is to be remembered in this connection that

the Erie are now equipped with air brakes. Eighteen per cent. of the freight cars have M. C. B. couplers and 5 per cent. air brakes. Air brakes are applied to all new box cars, and both improvements are proceeding as fast as the financial and mechanical resources of the company will admit. Mr. Tuttle and Mr. Bradley gave testimony similar to that of Mr. Thomas. Questioned by Mr. Rogers, Mr. Tuttle believed that state legislation had had no effect on the progress made by the roads; it has been too diverse in the different states, and the roads would have made improvements just as fast without it.

Major Myers referred to the fact that his committee does not give its members' opinions, but merely summarizes the views of the companies. Speaking personally, he reiterated Mr. Forney's views as to the efficiency of an investigating board, and quoted Charles Francis Adams as an authority on this point. The terror of public opinion is a more powerful incentive than the terror of legislation. The great improvements thus far made on railroads have been solely due to the anxiety felt by railroad officers that no injury to life or limb shall result from any act or omission of theirs. Virginia has no law touching safety appliances, but the M. C. B. coupler and other safety devices have been adopted as rapidly there as anywhere.

The afternoon session was opened by the representatives of the various employes' organizations. Mr. Coffin spoke briefly in favor of compulsory legislation, and said that his constituents had no desire to unduly crowd the railroads. Mr. Currier spoke briefly in the same line. Mr. Frank Sweeney said that he represented the Federated Order of railroad employes. These bodies do not recommend any particular drawbar. They demand uniformity, even if it be found necessary to stop short of perfection. His personal opinion is that the link and pin is better than the M. C. B. type, and he believes that to be the general sentiment of yardmen. The last annual meeting of the switchmen passed a formal resolution in favor of the link and pin type. Mr. Sweeney claims that at present it is necessary four times out of five to stop the train in order to pull a pin. He did not say, however, whether this is wholly due to the diversity of couplers in use or partly to heavy loads, long trains, etc.; nor whether he included M. C. B. couplers when he spoke of "pulling pins."

Mr. D. D. Sweeney told of the severe strain on common links when used in M. C. B. drawbars, which use is often necessary on account of breakages or defects which prevent two M. C. B. couplers coupling with each other. The link in such cases is almost sure to break. Various defects of uncoupling devices now in use were detailed at considerable length. "Nine times out of ten an M. C. B. coupler will not couple on a curve," although the type is all right on straight lines. He believed that the absence of slack in the M. C. B. standard was a marked disadvantage in starting trains, but had no knowledge of the Burlington trials, which tended to prove the opposite of this.

Mr. Hall spoke at length, corroborating the views of the last two speakers. He believes a majority of the yardmen prefer the link and pin. Did not know what the American Railway Association was; if it has decided upon a standard the roads ought to be compelled to move ten times faster in the adoption of that standard. Speaking of safety devices generally, he said that the blocking of frogs was greatly needed. A piece of pine board stuck in between the rails is miserably insufficient. Slivered rails cause numerous accidents.

Mr. A. D. Shaw spoke briefly in favor of legislation requiring uniformity, and reproached the switchmen for not being able to express a decided preference for some particular type of safety coupler.

Mr. Chamberlain (B. & M.) had collected the views of his trainmen and found them all in favor of the link and pin, and most of them in favor of the Safford. Mr. McWood is personally opposed to the vertical couplers, and agrees with the switchmen. He advocates an automatic link and pin coupler, and detailed the great expense of maintaining the M. C. B. coupler. In reference to the question of maintenance and the relative safety of vertical plane and link and pin couplers, Mr. Bradley inquired whether the former had not proved eminently safe in passenger service. Mr. McWood replied in the affirmative, but Mr. Hall at once explained that the roads do not and will not keep freight cars in the perfect repair which is given to passenger cars.

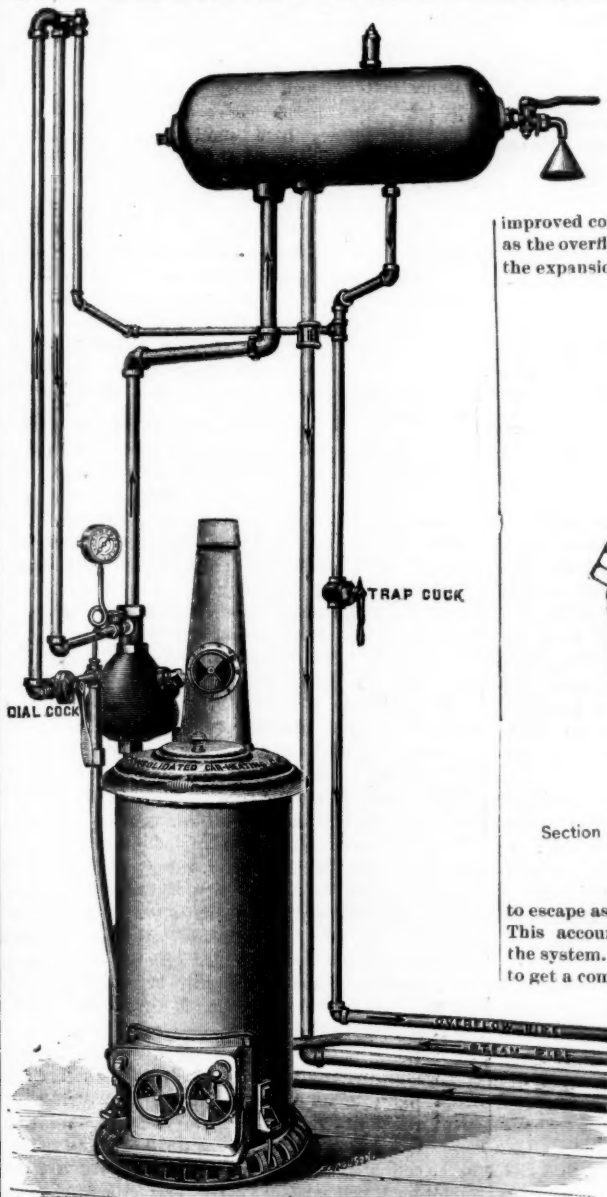
Mr. Rhodes, while not prepared to fully indorse the M. C. B. coupler, says that it is the best we can now take up. It is not, however, sufficiently perfected to warrant taking the matter out of the hands of the roads. Replying to one of the switchmen, who, in speaking of the slow progress made by the roads, referred to the C. B. & Q. as unenterprising, Mr. Rhodes stated the generally admitted fact that that road had paid out more money than any other in the country toward perfecting couplers and brakes. Continuing, he gave facts showing that the Burlington is now in the advance. An air-braked car never goes over that road without the brake being used.

Mr. Coffin made a strong argument in favor of the M. C. B. standard. Its use has now progressed so far that we have almost accomplished the long-wished for uniformity. To go back or stand still now is supreme folly. The air brake is as necessary as the coupler. More men are killed by falling from the tops of cars than in coupling accidents, and the air brake is necessary to stop

this slaughter. Referring to Colonel Haines' remark that the air brakes for a million cars would cost \$50,000,000, Mr. Coffin reminded him that the brake will be effective when one-third of the cars shall have been equipped. On both couplers and brakes legislation is necessary to spur the inefficient managers. The more progressive roads are doing well, but numerous dilatory companies must be driven. Public sentiment is not a sufficient incentive. It has compelled the introduction of improvements on passenger trains, but "there is no sentiment about an old box car."

The New McElroy Commingler for Car Heating.

The illustrations herewith show the essential features of the improved commingler system, devised by Mr. McElroy, and supplied by the Consolidated Car-Heating Co. to the Canadian Pacific and other roads. Steam is supplied to the commingler from the train pipe to heat



The New McElroy Commingler—Consolidated Car-Heating Company.

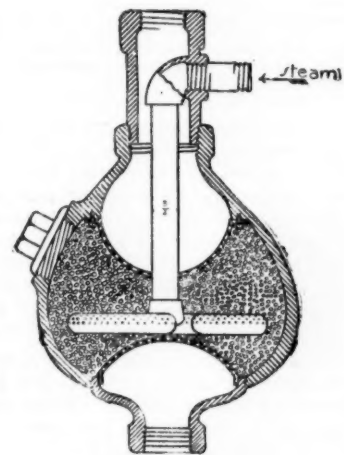
water circulating in each car. A constant circulation of water in the pipes is kept up so that all parts of the heating surface are maintained practically at the same temperature.

The apparatus is readily applied to cars already equipped with the Baker or other hot water apparatus without the addition of other pipes. The water heater remains intact, so that a fire may be started at any time. The few parts and the simple connections render its application to the heating apparatus, with which a great part of the passenger cars are already equipped, a simple matter. The heating capacity of the commingler is claimed to be several times as great as that of any other water heater. For instance, in the Whitehall Tunnel ditches on the Delaware & Hudson one commingler circulates water through over 2,000 ft. of pipe, and keeps the ditches free from ice in the coldest winter weather. This remarkable installation was described in the *Railroad Gazette* a year or two ago. The steam acts on the water of circulation directly within the body of the water itself, as shown in the section. The column of steam is broken up into jets by the pebbles in such a manner as to silently force the water through the commingler, and a forced as well as a gravity circulation is obtained. The addition of the forced circulation enables the commingler to move the water through the long circuits.

It is claimed that the water pipes and drum are kept constantly filled from the condensation which takes place within the commingler and thus water in the expansion drum is always level with the top of the overflow pipe. A further claim of great importance is that five pounds steam pressure in the train pipe at the car is sufficient to heat the largest car in the coldest weather. The small pressure required for operating this system has a practical value in increasing the life of hose and in the increased freedom from leakage at the connections between cars. "Experiments conducted last year under the supervision of the New York Central showed that circulation was rapidly established by the commingler with $1\frac{1}{4}$ lbs. of steam."

The simplicity and ease of management are evident from the fact that the heating apparatus is controlled by only one valve. It is further simplified by the fact that no thermostatic trap is used or other device requiring frequent adjustment. No part of the apparatus is placed under the car where it is liable to freeze.

One great objection to drum systems is that the air in the upper part of the expansion drum is compressed when an attempt is made to heat the car. The compression of the air may cause great pressure on the heating pipes, which sometimes becomes so great that circulation is not only impeded but entirely stopped. With the improved commingler this difficulty is not encountered, as the overflow pipe is connected to the air space within the expansion drum, which permits the compressed air



Section through Commingler B—One-fourth Size.

to escape as the water of the circulating system expands. This accounts for the rapid circulation obtained with the system. Thirteen minutes is all the time required to get a complete circulation.

With cars equipped with this system the drain cock can be opened and all pipes emptied before the car is laid up. The car then stands cold and without any danger of freezing. When it is again brought into service, steam is turned into the pipes through the commingler and the car is at first heated with direct steam. The drain cocks being closed, the water of condensation collects in the pipes until the system is filled with water and circulation automatically takes place. In cold weather the pipes are filled within two hours after steam is turned on and in the mean time the car has been heated with direct steam.

International Railroad Congress.

We have already announced the fact that M. Belpaire was elected President of the permanent Commission of the International Railroad Congress at the recent meeting in Brussels. The officers of this Commission are now as follows: *President*, M. Belpaire, Director of Belgian State Railroads; *Vice-Presidents*, M. Alfred Picard, Inspector General, Ponts et Chaussées, and M. Dubois, Director Belgian State Railroads; *Secretary General*, M. A. de Laveleye; *Secretaries*, M. Eugene Kesteloot, Chief of Division Ministry of Railroads, Posts and Telegraphs, Belgian State Railroads; Mr. Louis Weissenbruch, Engineer in the same Ministry; *Treasurer*, M. Edward Holemans, Chief of Division in the same Ministry.

State Operation.

The Austrian State Railroads recently adopted a series of regulations to be observed in running trains during stormy weather with high winds. According to these only cars loaded to within 75 per cent. of their carrying capacity may be run when the wind is of the nature of a hurricane. Open cars or cars loaded with straw, hay or boards must not be dispatched at all. In general the train lengths are to be reduced in such weather, and in the case of mixed trains the rear of each train is to be made up of from two to three loaded freight cars. Special attention is to be paid to the couplings, and these are to be examined carefully, not only at the start, but also whenever possible at way stations.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay. EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Commissioners' inquiry on safety appliances, reported on another page, made, to quote a daily paper, two things exceedingly clear: that the railroads do not want compulsory legislation on this subject and that the yardmen favor the link-and-pin coupler. These points were very well argued, a whole day being taken up by the hearing. The railroad officers made no arguments not familiar to the readers of the *Railroad Gazette*, and the yardmen only said what they have said before, but the fact that the bearing of this important and intricate question is being made clear to the reporters of the daily papers, as just intimated, and through them to the public, justifies the careful attention given to the subject by those who figured at this hearing, and demands that all railroad officers give it their intelligent interest. Legislation will undoubtedly be recommended and quite likely will be accomplished; and if "public opinion" is allowed to remain in ignorance upon any point the railroads are likely to be the sufferers. The interrogatories put by the members of the committee indicate that they may propose quite moderate legislation. As far as this hearing goes, they have strong arguments in that direction from both sides. The officers testified to the incompleteness of the various auxiliary devices that go to make up a perfect M. C. B. coupler and to the impossibility of attaining perfection except by the somewhat slow processes of evolution; while the yardmen corroborated these statements by telling of the difficulties encountered in their experience in handling the coupler. One of the most forcible lessons on this point—that connected with the question of unlocking devices—is given in illustrated form in another column of this paper. The only apparent reason for the firm stand taken by the yardmen in favor of the old style coupler seems to be now, as heretofore, their persistency in looking at the evils of the transition period instead of at the promised benefits of uniformity. This promise is decided and is daily growing brighter, in spite of all adverse influences; but each yardman seems to shut his eyes to everything outside his own yard. The fact that now, with a new coupler, more or less imperfect in its details, and with growing confusion as the proportion of new to old style couplers increases, they have to go between the cars a good deal, leads them to give up the hope of ever getting a coupler which it will not be necessary to go between the cars. It is hardly to be wondered at that such persistent ignoring of the reasons that have led to the adoption of the automatic coupler, and such total disregard of the efforts of the railroad commissioners, railroad officers and others who have worked for years to lessen the hazard of the brakeman's and the conductor's work, is held in some quarters to support the theory that the yardmen desire to have their vocation continue a hazardous one, so that they may have in that fact a powerful argument for securing increased wages.

The yardmen failed to emphasize their best point, which is, if they are right in saying they are every-

where hurried in their work, the need of giving more time for switching and of more careful attention to inspection and repairs of cars. More and better inspectors, with more time, are needed. Each yardman doubtless expects to resign or be promoted before the present diversity of couplers stops growing worse, and begins to become a benefit, and he naturally looks mostly at present evils. The railroad officers also gave scant attention to an important point, to wit, the certainty that the present action of the principal roads will tend powerfully to bring the slower roads into line. This has been illustrated in the matter of air brakes, Miller and Janney platforms and other things. A recent instance, in the very line under discussion, is the adoption of the M. C. B. coupler by the Boston & Albany after most strenuous objection to it, because the action of the New York Central and other important roads virtually compelled such adoption. The legal aspect of the question might also have been more fully emphasized. It is true that an obstinate railroad manager can obstruct commerce by refusing to interchange certain cars, and that such men sometimes base such refusal on fallacious grounds; but the practical fact is, nevertheless, that a road running mostly air-braked and close-coupled freight cars can compel its smaller connections to use the same kind. Technically, the alternative is to compel the dilatory road to reload freight at junctions, thus seeming to restrain commerce and to defy the law; but, in point of fact, persuasion will effect the reform in such cases, and force will not become necessary. In the long run the considerations affecting safe and speedy transit on the road are paramount to those relating to transfers, and questions concerning the latter must yield to the former.

The *Engineer* (London), in a recent editorial on high railroad speeds, has taken seriously the report made in the *Chicago* daily papers, and repeated by a correspondent in the *Railway Master Mechanic*, to the effect that a train carrying Jay Gould traveled a distance of 8½ miles in five minutes. It was known at the time, by those well informed in railroad matters, that the Gould fast run was a newspaper "fake." No such speed was attained, and the statement was not taken seriously in this country. The *Engineer* uses this reported velocity as a text, and reaches some curious results. One is that there must be a back pressure of 66 pounds per square inch in the cylinder at each end of the stroke in order to prevent knock. "It will be seen that the engine must run with large lead and early cutoff." We take this occasion to inform our contemporary that the average locomotive engine in this country, and in Europe for that matter, running at high speed, has a much higher pressure than 66 lbs. at the end of the stroke under ordinary conditions. It is not uncommon for the compression to reach boiler pressure, or 160 pounds per square inch; hence, we cannot see that there will be "a diminished hauling power below what is ordinarily had." What is said regarding the centrifugal tendency of the counter balance at high speed and its amount is true; but the gradual introduction of lighter cross-heads, lighter main rods and pistons, is reducing this effect rapidly. Our contemporary, by computation, shows that at 100 miles per hour the tension on the tire due to centrifugal force would be about 3,520 lbs. per square inch, and says, "This is perfectly safe for a tire without holes or flaws, but it must not be forgotten that it represents about double the stress to which any railway tire has hitherto been exposed." The stress per square inch in the tire, due to the shrinkage on the centre, is more than double this amount. From some figures before us relating to the practice in this country regarding the shrinkage sizes for driving wheel centres and tires, the stress per square inch may be calculated to be fully 15,000 pounds. Again, with such heavy pressures the wheel centre and the tire are two elastic mediums pressing against each other and the forces are balanced; hence the application of an increased pressure by reason of the centrifugal force reduces the pressure on the wheel centre, and the total amount of the tension resulting from the centrifugal force cannot, therefore, be added to the tension produced by shrinkage. Our contemporary further says: "The use of coupling rods is, of course, out of the question. Fortunately, Mr. Craven's sand blast renders us independent of coupling rods for express engines." A sand blast may render an English locomotive, with its light train loads, "independent of coupling rods," but it would not do here. The additional traction gained by a sand blast is not the equivalent of an additional pair of wheels, to say nothing of a third pair, which we frequently find necessary in order to start the trains quickly enough and to keep up the speed in bad weather on grades. In this country an express engine

must have a coupling rod unless some new means of driving four or six wheels is discovered. In the *Railroad Gazette*, Sept. 18, page 645, there is an authentic account of a fast run on the Philadelphia & Reading, where the locomotive, with a total train load of 337,000 pounds, attained a speed of 90 miles per hour, and this with coupling rods.

The grain movement has perceptibly improved during the last ten days, and although the press dispatches headed "Car Famine" still seem to be written largely for the purpose of "filling," the roads are having plenty of work and many of them are crowded. The fall movement of all kinds of commodities helps to this end of course, a division of the Rock Island road, for instance, being overwhelmed with potatoes. The Trunk line presidents met last week and "restored" east-bound freight rates; but as there were few or no open cuts it must be concluded that they simply made a new resolve to repress trickery. The reporters claim to have learned that every road but two confessed to cutting live stock rates by using private owners' cars. It is said that grain-receiving facilities at European ports have been, or soon will be, taxed to their utmost capacity, and as the pressure has already compelled the extensive use of canal-boats for storage in New York harbor, the railroads can have the satisfaction of knowing that lack of cars will not be the only reason why farmers cannot get rid of their grain promptly. The second-class sleeping car question came up again at the trunk line meeting, and the Erie, the only American trunk line using these cars, agreed to take them off, provided the Canadian roads would first do likewise, but there is little danger that the Erie will have to take any action. The second class sleeper has great vitality, and in view of the near approach of 1893, when the non-wealthy people of New England will want to go to Chicago in neat but inexpensive comfort, its prospects may be said to be looking up rather than otherwise.

Ten Years' Growth of Traffic and Earnings in the United States.

We summarize below the chief facts for 1880 and 1889, given in the two interesting census bulletins which give railroad statistics of New England and the Middle Atlantic States for each of the ten years from 1880 to 1889, abbreviating the figures in many cases to make them more readily comprehensible:

	New England.		Middle States.	
	1880.	1889.	1880.	1889.
Miles of railroad.....	5,394	6,903	14,276	18,088
No. locomotives.....	1,616	2,151	5,517	8,129
Passenger train cars.....	2,622	3,803	5,601	8,523
Freight cars.....	35,551	49,140	212,276	334,155
No. stations.....	1,849	2,283	3,857	5,639
No. employees:				
Maint. of way.....	9,008	11,339	35,587	57,867
Maint. of equipment.....	5,451	7,904	27,562	45,120
Conduct. transport.....	16,440	25,927	59,469	100,060
Gen. administration.....	1,086	1,416	3,847	5,814
Total.....	32,555	49,586	126,495	208,921
Tons freight (millions).....	24.0	35.3	145.7	241.9
Ton-miles.....	1,391.4	2,313.3	12,556.0	23,095.0
No. passengers.....	52.2	103.4	81.7	189.1
Passenger miles.....	872.1	1,551.6	1,655.3	3,293.9
Freight miles (millions).....	17.4	29.3	70.3	103.7
Passenger.....	16.2	25.8	36.6	70.0
Other.....	3.8	10.2	15.3	40.2
Total.....	37.4	56.3	122.2	213.8
Earnings (millions of dollars):				
Freight.....	25.7	34.0	141.3	189.7
Passenger.....	21.4	33.5	44.9	74.2
Total.....	47.8	67.8	187.7	264.6
Other income.....	1.2	1.7	14.5	17.6
Total income.....	49.0	69.5	202.2	282.2
Per cent. of expenses.....	65.25	68.78	58.74	65.66
Working expenses.....	21.2	46.6	110.2	173.7
Int. on funded debt.....	4.6	5.5	31.3	36.5
Rentals.....	2.3	7.3	19.3	28.7
Taxes.....	1.6	3.0	4.3	6.4
Dividends.....	6.9	6.0	18.8	19.3
Surplus.....	2.1	0.6	11.4	7.9
Expenses:				
Maint. of way.....	7.9	10.8	22.4	35.4
" of equip.....	5.4	7.7	29.7	40.4
Conduct. transport.....	15.4	24.5	52.7	86.3
Gen. expenses.....	2.5	3.6	5.4	11.6

Let us summarize these statistics still further, putting in juxtaposition significant facts, so far as we have them; for it will be remembered that the bulletins give no figures for capital or cost.

First, in New England, with an increase of 16½ per cent. in miles of road, of 33 per cent. in number of locomotives, of 45 per cent. in passenger cars, of 40 per cent. in freight cars, and of 52 per cent. in the number of men employed from 1880 to 1889, the railroads carried 66 per cent. more freight traffic, with 16½ per cent. more freight train mileage (the average freight train load having increased from 80 to 114 tons), and carried 78 per cent. more passenger traffic with 59 per cent. more passenger train miles (the average passenger train load having increased from 54 to 60.2 passengers). It did this increased work with an increase of 49½ per cent. in the working expenses, and received for it an increase of 43 per cent. in gross earnings. The freight earnings increased 82.4 per cent. for an increase of 66 per cent. in traffic, and the passenger earnings increased 56 per cent. for an increase of 78

per cent. in traffic. The net earnings (not separately stated in the bulletin) increased from \$16,601,488 to \$21,157,114, or 27.4 per cent. The interest charges increased 20 per cent. and the taxes nearly 90 per cent., but dividends of the operating companies fell off 13 per cent., substantially the whole increase in net earnings being absorbed by increased rentals, which of course means income to the lessor companies.

For the Middle States railroads (Group II.) we find an increase of 26.7 per cent. in miles of railroad, of 47½ per cent. in number of locomotives, of 52 per cent. in passenger train cars, and of 57½ per cent. in freight cars. With these additional facilities, and with 65 per cent. more men employed, these railroads carried 84 per cent. more freight traffic with only 47½ per cent. increase in freight train mileage, and 99 per cent. more passenger traffic with an increase of 91 per cent. in passenger train mileage, the average train-loads having increased from 179 to 223 tons and from 45.2 passengers to 47. But the increase of 84 per cent. in freight traffic was accompanied by an increase of only 33½ per cent. in freight earnings, and the increase of 99 per cent. in passenger traffic by an increase of 65½ per cent. in passenger earnings, the average rates having fallen from 1.044 to 0.808 cents per ton-mile, and from 2.232 to 1.995 cents per passenger-mile, and the net earnings having increased \$13,446,000, or 17½ per cent., which for an increase of 90 per cent. in traffic seems very moderate. The amount paid in interest on funded debt has increased one sixth, the rentals nearly one-half (West Shore and the like), the taxes also nearly one-half, but the dividends only 2½ per cent. On the capital actually invested the return was very much less in 1889 than in 1880 for this group of roads, as is very well known, but just what this decrease was we cannot say, no statistics of capital being given. The decline in railroad values, however, is not shown fully by comparison with 1880. That was a year of extraordinary earnings, but not of extraordinary dividends. These were largest in the Middle States in 1883, when they were \$26,300,000, and \$7,000,000 (36 per cent.) more than in 1889, and the total received on the capital invested in the roads, in interest, rentals and dividends, was \$4,200,000 less in the latter year, so that the increase of capital, of service, and the great increase in traffic (about 45 per cent.) since then has yielded no return to the railroad owners, but has profited the public exclusively.

"The Flagging Absurdity."

The contribution on block signaling, printed in another column of this issue, is from one of the highest experts in the science and art of railroading. We are glad to print such strong words—and they are none too strong—for the influences in favor of temporizing expediency are so varied and so overshadowing that a superintendent is in constant danger of forgetting that the only justification for using any but the best methods of train running is an absolute lack of money. The attention can be so absorbed in the reports of earnings, the attempt to hand over 30, 35 or 40 per cent. of these to the directors with unvarying cheerfulness, and in the hundred superficial things constantly pressing upon one's notice, that a clear statement of the true principles embodied in an ideal system needs to be read occasionally as a tonic.

The most radical passage in this letter is that which recommends *doing away with the flagging absurdity altogether*. It needs but little careful study of the conditions under which trains have to be run on crowded lines to convince any one that, whatever good there may be in flagging, when flagging is done, no rule or code of rules has yet been invented by which the superintendent can have any assurance that flagging is actually done. We can imagine an efficient brakeman who might do good service in protecting his train by using his own judgment in addition to what he could learn from the rules; and it might be possible to draw up a workable rule, provided every train could have a corps of rear brakemen as numerous as the irregular stops it is likely to make; but the best roads continue to be unsuccessful in finding our efficient brakeman and putting him into service, and no one can afford the large number of brakemen of ordinary quality that would be required to carry out the rules as now prescribed.

This being the case we have several times reminded our readers that the excellent record of the English railroads is made under a system which fully complies with the demand of our correspondent. Where they use the block system they do away with the flagging absurdity altogether. It is true that they keep the "absurdity" on their books and thus make it doubly absurd, but practically the block signals are the only warnings presented to an engineman to keep him from running into the train ahead of him.

Our correspondent's argument may be translated into an appeal: Who will be bold enough to adopt the block system and throw away rule 99 altogether? The abolition of this rule would at once greatly simplify the discipline and would really include the abolition of rules 96 and 97 also, which are even more difficult to administer than is 99. Where there is an absolute block system, and very frequent trains, these rules are constantly requiring impossibilities; and even where permissive blocking is allowed their most noticeable effect is to produce constant uncertainty; the flagman is lazy because he knows there is a block system, and the engineman is heedless of torpedoes because he knows that the other means taken to protect him are in all probability sufficient—that at least the law of chances will bring the next collision to his train 100 years after he is dead. On the other hand, if dependence upon flags and torpedoes were wholly thrown aside there would naturally be an immediate increase of vigor and thoroughness in the administration of the block system itself, and the good influence of such an advance would be felt in other branches of the service.

Real courage will be required to stand out as the first American railroad officer to run trains by a space interval, pure and simple. It would be a sufficiently startling innovation even with the Sykes safeguards, but without these and with the possibility of a collision from forgetfulness of an operator, it would be necessary to have well-founded faith in the superiority of the space over the time interval and precise knowledge of it at one's command. But those who think there is no call for this kind or quality of courage should ask themselves how the matter stands now. It must require a high degree of courage, or some other brazen quality, to assert before the courts or the public that there is any real security in a code of rules which never can be enforced literally and which experience has demonstrated is not susceptible of enforcement with even temporarily passable success. Every superintendent must admit that whatever immunity from collision he enjoys under the flagging system is due largely to the good judgment and faithfulness of his men; but just as soon as a man who lacks good judgment or conscientiousness lets two trains together the superintendent must fall back on his impracticable rules as his only defense. It is hard to see how this sort of argument can afford any satisfaction to the superintendent himself, howsoever successful may be its influence upon the lawyers and jurymen.

E. N. P.'s criticism of the system of giving cautionary signals only by written order brings up the question: Where shall we draw the line between light and heavy traffic? With a very light business or on a new road, or where block sections are very long, it may seem impracticable to discipline the enginemen so that they will obey a signal which they see for a few seconds, as surely as they will obey a paper which they can hang up before their eyes and keep it there till the order is executed; but, on the other hand, a heavy traffic will finally compel the abandonment of written orders for most of the train movements, for the simple reason that there will not be time to write them. When shall we break away from the slower method and adopt the only one which will serve at all times and all places? Most companies that do any block signaling have at least short pieces of road on which traffic is heavy, and it is certainly desirable to establish uniformity of practice in this matter throughout the lines of each company, not to mention the advantages of uniformity all over the country. Any movement toward uniformity should tend in the direction that favors the most important parts of a road for the obvious reason that the divisions doing a light business are liable to become like the busier ones, while the busy ones are not likely to grow less busy. The necessity for the more expeditious methods on the busy divisions is based on considerations of real economy and not on a mere imaginary necessity for quick time. By giving permissive signals outdoors it is often possible to avoid stopping a heavy train, which involves not only cost and delay but also some risk of a break-in-two when starting, which frequently changes a slight delay into a vexatious one. Where the traffic is of a miscellaneous nature the movement of a number of trains can often be greatly facilitated by suspending the block system for heavy freight trains during a few hours on a clear day, as by this means a piece of road can be kept literally filled with trains for a limited period. On the other hand, the time interval as an adjunct to the permissive system in a measure defeats the main purpose of permissive signaling. Whenever permissive blocking is necessary on account of a wreck or blockade, it is almost certain that the suspension of the time interval, as well as the rigid space interval, will be found desirable.

It ought to be easy to train enginemen to obey a semaphore as faithfully as the ywould a written order, and officers who have insisted on the fireman's responsibility as an assistant to the engineman in observing signals have got satisfactory results from such a requirement; but possibly a compromise is practicable. One of the reasons for giving written orders being the advantage, thereby secured, of a visible paper, why not supply each engineman with a pack of caution cards, one of which is to be "placed in the clip before him until executed," like a train order? The caution order on the Chesapeake & Ohio consists of a green card with a notched end. With one of these before him an engineman would virtually be taking the semaphore along with him through the section. The cards could be indorsed and sent to the superintendent afterward. Why need they be filled up with the number of the preceding train, or the time of its departure? The only right way to run under a permissive signal is to keep the speed absolutely under control, so as to avoid striking any kind of a train at any point in the section. Enginemen might be required, on passing a tower where a permissive signal is shown, to exhibit to the operator the cautionary card that he is about to use.

This arrangement of a visible monitor in the cab would provide for the case of the runner who sees a semaphore and straightway forgets what manner of signal he has seen; but, after all, the main difficulty is, not to get men to remember that they have been cautioned, but to get them to act in accordance with the caution; and to do this the only sure plan is to get good men and then inspect their conduct often enough to keep them good.

The Economical Limits of Steam Pressures.

We have received from Mr. A. F. Nagle, consulting steam engineer, Chicago, the accompanying diagrams and tables showing the variations in steam economy which follow variations in steam pressures. These results are based on a theoretical engine, and do not take into consideration the losses due to clearance, wire drawing and compression, nevertheless they are useful and will continue to be useful until the effect of these losses is better understood. When the variation in economy of locomotives accompanying a variation in the steam pressure has become common knowledge, we may ask for something better than this. It is an interesting study from the standpoint of a locomotive engineer to examine such theoretical cases as these, which show the possible gains under the best conditions to be obtained by increasing the steam pressure.

The diagram shows the variations in water required per horse power per hour with different kinds of engines with different grades of expansion and different steam pressures. The pressures are given as absolute pressures. The back pressure in the non-condensing engine is assumed at 16 pounds absolute and in the condensing engine at 2 lbs. absolute pressure. No allowance is made for clearance, wire drawing, excessive compression and condensation. The formula on which these diagrams were calculated is as follows:

$$W = \frac{1,980,000}{144 V R \left[\frac{P_1 + \text{Hyp. Log. } R}{R} - p \right]}, \text{ in which}$$

W = pounds of water per horse power per hour.
V = volume of steam per pound at the pressure P.
R = number of expansions.
P = absolute initial steam pressure.
p = absolute back pressure.
1,980,000 = foot pounds of work performed by one horse power continued for one hour.

The following tables are calculated by the preceding formula and the diagrams are laid out from the tables: TABLE SHOWING THE WATER USED PER HORSE POWER PER HOUR IN A NON-CONDENSING ENGINE BY CALCULATION, NO ALLOWANCE BEING MADE FOR LOSS BY CLEARANCE, WIRE DRAWING, EXCESSIVE COMPRESSION, OR CONDENSATION. ASSUMED BACK PRESSURE 16 POUNDS ABSOLUTE.

Number of Expansions.	Absolute Steam Pressures.						
	100 lbs.	125 lbs.	150 lbs.	175 lbs.	200 lbs.	250 lbs.	300 lbs.
3	19.60	18.25	17.40	16.82	16.29	15.74	15.32
4	18.00	16.60	15.66	15.09	14.61	14.00	13.60
5	17.50	15.90	14.94	14.33	13.81	13.11	12.70
6	17.33	15.53	14.43	13.74	13.15	12.52	12.11
8	17.60	15.28	13.95	13.11	12.45	11.73	11.29
10	18.70	15.53	13.87	12.89	12.15	11.30	10.75

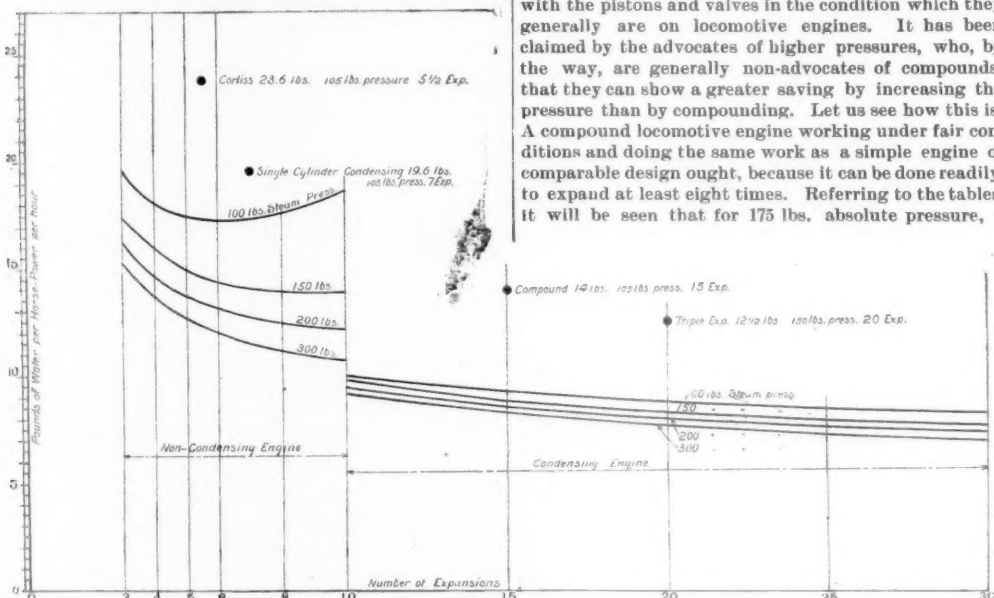
TABLE SHOWING THE WATER USED PER HOUR IN A CONDENSING ENGINE BY CALCULATION, NO ALLOWANCE BEING MADE FOR LOSS BY CLEARANCE, WIRE DRAWING, EXCESSIVE COMPRESSION, OR CONDENSATION. ASSUMED BACK PRESSURE 2 POUNDS ABSOLUTE.

Number of Expansions.	Absolute Steam Pressures.						
	100 lbs.	125 lbs.	150 lbs.	175 lbs.	200 lbs.	250 lbs.	300 lbs.
10	10.02	9.98	9.78	9.63	9.48	9.32	9.18
15	9.30	9.04	8.83	8.68	8.53	8.37	8.24
20	8.81	8.51	8.30	8.14	8.00	7.83	7.69
25	8.53	8.20	7.98	7.79	7.64	7.46	7.33
30	8.35	8.00	7.79	7.50	7.41	7.22	7.08

The black dots on the diagram show the best results

that Mr. Nagle has found with or that have been recorded of a non-condensing Corliss engine at 5½ expansions and 105 lbs. absolute steam pressure; a single cylinder condensing at 7 expansions and 105 lbs. absolute steam pressure; a two-cylinder compound engine at 15 expansions and 105 lbs. pressure, and a triple expansion engine at 20 expansions and 105 lbs. pressure. It is interesting that a curve drawn through these points approximates in shape to the form of the curves of variation of economy accompanying a variation in the number of expansions. This would tend to show that the gain in economy brought about by modern improvements in engines follows about the same general law as the theoretical gain in economy due to increasing the number of expansions.

This may be the natural result of our efforts to get better engines; we seek for engines which give a greater number of expansions and at the same time also seek to reduce the cylinder condensation. A reduction of cylinder condensation would modify the curve of comparative economy gained by different designs of engines, and if there was an enormous change in the cylinder condensation with the newer types of engines there would be less difference between the theoretical amount of water per horse power and the actual. It is, of course, too narrow a basis that we



Pounds of water per horse power per hour consumed by engines working with different degrees of expansions and under different steam pressures (absolute).

Back pressure, non condensing engine, 16 lbs. (absolute); back pressure, condensing engine, 2 lbs. (absolute). No allowance made for clearance or condensation.

have to build upon in the present instance to draw a conclusion from the diagram that there is not a great reduction in cylinder condensation by using triple expansion engines, and that much of the saving is obtained from the increased number of expansions; yet such a conclusion is pointed at by the results herewith. Some bold steam engineers do not hesitate to say that the increased expansion has more to do with the saving in compound and triple expansion stationary engines than the reduction in the cylinder condensation.

For locomotives this statement is probably nearer the truth than for stationary engines. The conditions of locomotive performance are such as to render the saving by increasing the number of expansions of far more importance than the gain by reducing the cylinder condensation. It is not to be deduced from this that if we put larger cylinders on a locomotive and obtain greater expansion we shall reap the same economy as if the engine was made compound, for several reasons. The principal one is that with the locomotive engine there is much back pressure, a high compression, and an exceedingly poor admission at the short cut-offs where the necessary expansions would be obtained. These disadvantages, resulting from inferior mechanical devices, so modify the action of steam in locomotive cylinders that the ordinary rules of practice and formulae for stationary engines do not hold for locomotive work. With the Stephenson link there is a point soon reached in the number of expansions where the mechanical action of the engine is so bad as to render it advantageous to expand first in one cylinder and then in another with a comparatively long cut-off in both.

The diagrams show, not the results that may be obtained under ordinary conditions of engine practice, but what is probably the best theoretical result; and while these results are hardly comparable with the results obtained from service, yet they are as comparable one with another as the different actual results may be expected to be. Hence, it is not far from the truth to conclude that the difference in saving due to a change in the number of expansions or a change in steam pressure shown by the theoretical results in these tables and diagrams may be expected to be nearly the same, or at least greater than the differences which would be obtained from actual engines with the same expansions and steam

pressures. At least, it is generally concluded that a theoretical saving is almost always greater than that obtained from actual trial of engines. If we can accept this, then from these diagrams we can learn what is the highest possible saving on a locomotive resulting from a change in steam pressures.

This point is particularly pertinent, as there are railroad engineers who claim that there is a decided saving to be gained by increasing the steam pressures in locomotive boilers. The two most notable instances of this are, one in this country on the Old Colony Railroad, and the other in Scotland, on the Caledonian. Both expect considerable advantage from a change in steam pressures to 200 lbs. per square inch. Mr. Lauder, of the Old Colony, has used 170 lbs. per square inch above the atmosphere for a long time, and in changing to 200 lbs. he would, according to this diagram, with about five expansions, which is near the utmost limit at which the Stephenson valve gear of ordinary form is practicable, obtain about five per cent. saving, provided that the increase of pressure does not cause more than five per cent. increased leakage through the valves and pistons. Surely something would have to be deducted from the five per cent. shown on the diagram as being the best possible saving, in order to allow for the additional loss by leakage, which must occur with the pistons and valves in the condition which they generally are on locomotive engines. It has been claimed by the advocates of higher pressures, who, by the way, are generally non-advocates of compounds, that they can show a greater saving by increasing the pressure than by compounding. Let us see how this is: A compound locomotive engine working under fair conditions and doing the same work as a simple engine of comparable design ought, because it can be done readily, to expand at least eight times. Referring to the tables, it will be seen that for 175 lbs. absolute pressure, a

when the pressures were increased from 20 to 80 lbs., and some have thought that the difficulty of proper lubrication at high pressures was the practical limitation of steam pressure; and when Mr. Perkins, an American engineer in England, after overcoming many mechanical difficulties, constructed engines for working steam at 300 lbs. pressure, did not obtain advantage in an increased economy over engines working at about one-half that pressure, there was considerable disappointment. If these diagrams and results may be taken as comparable one with another in the same way that the actual results would be, when obtained from engine trials, then there is an explanation, and a good one, for the lack of advantage with high pressures which was shown by Mr. Perkins' experiments.

This is a subject which can be discussed indefinitely, and there will always be new and interesting lines to follow out. At the present time the most desirable and profitable one to locomotive men is that which will show the theoretical advantages to be obtained by compounding and increased steam pressures, for the reason that the theoretical advantage will be the limit and no actual trial can ever show more than this when the records are properly kept. However, it must not be thought from this that a locomotive as a whole, with the boiler included, may not show more economy than would be indicated by the theoretical results, as the uncertain element of the boiler action may overturn the entire prognostication and increase the saving above the calculated limit.

Annual Reports.

East Tennessee, Virginia & Georgia.—This company reports for the fiscal year ending June 30, 1891. The results of operation tabulated immediately below are for the East Tennessee, Virginia & Georgia proper. The results including properties controlled by ownership of stock are given separately.

Earnings:	1890.	1891.	Increase or decrease.
Miles.....	1,197.5	1,265	I. 67.5
Freight.....	\$1,656,310	\$1,744,930	I. 88,620
Passengers.....	1,444,326	1,624,519	I. 179,992
Mails.....	119,621	127,505	I. 7,884
Express.....	104,143	113,509	I. 9,366
Miscellaneous.....	87,148	108,216	I. 21,068
Total.....	\$3,412,078	\$3,718,729	I. 306,651
Knoxville & Augusta, net, and other miscellaneous.....	14,682	126,304	111,622
Total.....	\$6,426,760	\$6,845,033	I. 418,273
Expenses.....	\$4,175,993	\$4,455,984	I. 279,991
Net earnings.....	2,250,767	2,389,049	I. 138,282
Fixed charges.....	1,366,737	1,889,982	I. 523,245
Taxes.....	162,845	188,302	I. 25,457
Surplus.....	721,185	271,532	D. 449,653
Per mile:			
Earnings.....	\$5.367	\$3.411	
Expenses.....	3.187	3.523	
Net.....	1.880	1.889	

The items of operating expense all increased except that of maintenance of cars, which decreased 28.7 per cent. The greatest increase was in conducting transportation, which was 16.3 per cent. Including the Knoxville & Ohio, the Mobile & Birmingham, the Louisville Southern, the Memphis & Charleston, the Alabama, Great Southern, and the Cincinnati, New Orleans & Texas Pacific, making a total of 2,573 miles, the results for the year are:

	Total.	Per Mile.
Gross earnings.....	\$16,397,503	\$6.372
Operating expenses.....	11,007,624	4.278
Net earnings.....	5,389,879	2.095
Fixed charges.....	3,890,609	1.512
Taxes.....	391,424	
Surplus.....	1,107,846	

The increase of fixed charges for the E. T., V. & Ga. for the year is accounted for by interest on \$6,000,000 Cincinnati Extension bonds; on \$3,100,000 extension bonds issued for branches, and some minor items. During the year bonds to the amount of \$720,000 were issued on account of 36 miles of new road built, and \$1,000,000 of bonds were issued on improvement, equipment and betterment account.

The tons carried increased 6.6 per cent. to 3,443,851 tons, but the ton-miles declined 2.2 per cent. to 524,079,201. The increase was in local tonnage, while the through fell off. This also explains the fact that the rate per ton-mile rose from 0.87 cent to 0.91.

The train mileage increased from 3,223,982 in 1890 to 3,511,057 miles in 1891, or 8.90 per cent. The tons per train decreased from 185.1 tons in 1890 to 168.2 in 1891, or 9.13 per cent., caused by train mileage on new lines acquired where the tonnage is light, and also by the severe competition in the rapid movement of merchandise, cutting down train loads, and in many cases making an increase in light mileage.

The passengers carried were 1,253,622, an increase of 22.55 per cent. The passengers carried one mile were 64,205,534, an increase of 9.35 per cent. The earnings per passenger per mile were 2.53 cents, as compared with 2.46 cents the previous year.

The motive power is still rather short, there being but 150 locomotives fit for the heavy main line traffic out of a total of 227; and the President calls especial attention to a shortage of about 4,000 cars in the freight equipment. This, he thinks, should be supplied very soon, not only to save the excess mileage of \$228,579, but because it will be physically impossible for the northern lines to lend the cars to do the business of the road.

The General Manager's report contains a mass of fig-

ures of use to the student of matters of traffic and of operating economy, but we shall not attempt to dig out any of the important facts now, merely reprinting the following table showing the earnings and expenses per mile of road for seven years:

	Miles.	Earnings.	Expenses.	Net.
1885.....	1,032.5	\$3,577.58	\$2,425.34	\$1,152.24
1886.....	1,032.5	3,639.36	2,328.63	1,310.73
1887.....	1,032.5	4,230.68	2,809.91	1,420.77
1888.....	1,032.5	4,949.06	3,163.71	1,785.35
1889.....	1,067.1	4,968.26	3,162.47	1,805.79
1890.....	1,197.5	5,306.81	3,487.26	1,819.55
1891.....	1,265.0	5,411.09	3,522.52	1,888.57

The results of the trial of three compound locomotives are given on another page.

Manhattan Elevated.—This company reports for the year ending Sept. 30, 1891. The results of operation are as follows:

Manhattan Lines:			
Gross earnings.....	\$10,103,897	I.	\$715,216
Operating expenses and taxes.....	5,544,277	I.	237,048
Net earnings.....	\$4,559,619	I.	\$478,067
Suburban Branch (July, August and September only):			
Gross earnings.....			\$71,038
Operating expenses and taxes.....			63,752
Net earnings.....			\$7,286
Total net earnings.....			\$4,566,906
Interest on bonds and rentals.....			1,916,080
Balance.....			\$2,650,826
Surplus over dividends.....	\$970,826	I.	\$47,154

Following are statistics of the passengers carried:			
Second Avenue Line.....	32,574,091	D.	718,347
Third Avenue Line.....	77,978,822	I.	5,640,524
Sixth Avenue Line.....	69,254,641	I.	7,411,552
Ninth Avenue Line.....	19,520,387	I.	1,160,680
Total.....	199,327,941	I.	13,494,209
Suburban Branch (July, Aug. and Sept.).....	1,417,777		
Grand total passengers carried.....	200,745,718		

Total passengers carried from opening of the road to Sept. 30, 1891, 1,591,869,927.

It will be seen that the average per day including Sundays and excluding the Suburban lines was over 546,000. The average last year was 509,000.

The Chicago Real Estate Board has recently passed an important resolution which may affect the height of buildings in that city. There is a feeling that the City Council will pass an ordinance limiting the height of buildings according to whatever recommendation is made by the Real Estate Board, provided it is reasonable. The resolution passed is about as follows: Office buildings to be limited to 180 feet; mercantile buildings, wholly or in part, to 10 stories; apartment houses and family hotels to 100 feet. The Builders' & Traders' Exchange has passed resolutions condemning the high buildings now being erected, and has asked the Real Estate Board to consider steps toward the elimination of the height. It is stated that there is great unanimity of opinion among the members of the Illinois Chapter of the American Institute of Architects to limit the height to 135 feet. The Secretary of the Institute presented resolutions to the Real Estate Board recommending an ordinance in favor of limiting the height of all buildings 135 feet from sidewalk to top of wall or level of flat roof, excepting only crane and coal elevators, sugar refineries, spires and domes, etc., which are not brought within this limit, provided they are fireproof. This limit of 180 feet, recommended by the Real Estate Board, is not low. There are a few buildings in the city above 180 feet in height. Among others which are more than this are the Monadnock, Woman's Temple, Unity, and Masonic Temple. The Tacoma building is 165 feet. One hundred and eighty feet will admit of 14 ordinary stories.

Yesterday afternoon an interesting ceremony took place at Bordentown, New Jersey. It was on the completion of the monument erected by the Pennsylvania Railroad Co. to mark the first piece of track laid between New York and Philadelphia, and to commemorate the Sixtieth Anniversary of the first movement by steam upon a railroad in the State of New Jersey, Nov. 12, 1831. The formal ceremonies included an address of presentation by Mr. J. T. Richards, Assistant Chief Engineer of the Pennsylvania; one of acceptance by Mr. F. Wolcott Jackson, General Superintendent United Railroads of New Jersey, and an historical address by Mr. J. Elfreth Watkins, Curator U. S. National Museum. The limits of the first section of track laid were carefully ascertained and are marked by two monuments. We quote from Mr. Richards: "The larger monument needs an explanation, as its manner of construction is a matter of history well worth preserving. The foundation stones are the original blocks upon which the rails were originally laid—cut to form a proper bond for masonry. The rail is from the original track, 42 lbs. per yard in weight. The joints are from the original track, as are also the spikes which we have gathered for the purpose—the stone blocks placed as supports for the rail are arranged without hammer dressing to show their original shape, and the cube of granite is a fitting milestone in the history of the railroad."

A good many car designers should take more care regarding the location of the airbrake rigging and foundation gear. It is a continual source of annoyance to carbuilders and airbrake companies to have to redesign brake gear to suit different designs of cars which might

as well be made all alike, or, at least, with due deference to the location of the foundation brake rigging. Not infrequently car manufacturers get drawings of a freight car without any location being given for the brake gear. They build the cars according to the drawings, and when they try to put on the brake rigging it is found there is not room enough between, or on either side of, the needle beams for the brake levers, cylinders and fulcrums. The exact location of the needle beams matters but little. They may as well be far enough apart to give proper room for the brake gear as to be crowded together, as they frequently are. Cars that are being built to-day without brakes may have to be furnished with them before the life of the car is ended; hence, it would be best for every car designer, whether the cars have brakes or not, to make proper provision for their location. Those who have not run into this difficulty will perhaps not appreciate the force of this; but those who have will understand the demand for a better consideration of the means and room for the application of a modern brake rigging on all cars built.

The "Alley" Elevated Road, Chicago, will have a capacity sufficient to carry 20,000 people per hour to and from the World's Fair, running trains 1½ minutes apart. The delay in finishing the construction of the road between Van Buren and Thirty-ninth street is due to the litigation regarding the property needed. The condemnation suits required time to settle, but they have been settled at last, and the necessary iron work where the breaks occur can be put up at short notice. The material is all on hand, and every break in the road can be spanned in ten days' time if necessary. South of Thirty-ninth street it is proposed to run parallel to the alley between Prairie and Calumet avenues, and there will be no trouble in securing the property needed. The line will not occupy the alley itself, but land purchased by the railroad company on one side of it.

Some of the roads west of Chicago are trying to bring about an agreement to advance the rate for meals in dining cars from 75 cents to \$1. The most convincing argument in favor of such a change is the fact that practically every road is losing money on the dining car service. Judging from the past, however, there is little likelihood that any change will be made. Each line is anxious to do all the advertising it can and one of the favorite methods is through the dining car service. As General Manager Mellen of the Northern Pacific says in his annual report, the cost of this branch of the service should be considered as one of the necessary expenses of the passenger department, and only the results of that department as a whole be considered when estimating the monthly or annual profits.

NEW PUBLICATIONS.

The Practical Catechism. A Collection of Questions on Technical Subjects by Manufacturers and Others and of Answers thereto. By Robert Grimshaw, M. E., Ph.D. 16mo.; pp. 296; index. New York: John Wiley & Sons. 1891. Price, \$1.25.

The indefatigable Dr. Grimshaw, having made half a dozen or so catechisms of special subjects, has at last turned out one of things in general. It would be impracticable to give a list of the topics treated in this volume, but they range from "air" to "work," and include a considerable division headed "miscellaneous." Opening at random we find the question, "How can the earth be weighed?" About a page is devoted to the answer. Again, "How are hydraulic limes made?" Again, "Is there such a thing as a band saw that can be

made between a point of a steam system where condensation take place, and the boiler which generates the steam. See *Railroad Gazette*, April 3, 1891. The subject is an interesting one, and under some conditions the use of the steamloop may result in a decided saving. Those who care to become familiar with the curious phenomena of water rising from a low point, and entering the boiler under pressure, will find a clear explanation given in this pamphlet of 30 pages.

This volume contains 32 pages of proceedings and 1,184 pages of papers. It has also an excellent index, occupying 23 pages more. The proceedings cover the international meetings at New York and Pittsburgh last fall, the meeting of the Iron and Steel Institute of October, 1890, and the report of the general excursions of the American reception committee. The papers include those presented at the meetings held during the visits of the German and British ironmasters and the annual meeting, February, 1891.

Journal of the Franklin Institute. September, 1891. The Committee on Science and the Arts reports on the Bevington Process of Welding Metals and Spinning Tubes and the Goetz Mitchell System of Anchoring Beams in Buildings. There is also a paper by Mr. John Berkinbine on the development of Pig Iron Manufacture in the United States. The chemical section contains several notes of unusual interest.

Technology Quarterly; July. Massachusetts Institute of Technology. Boston.

The paper of particular interest in this issue is on the Candle Power of Incandescent Lamps as Related to Current, Voltage and Energy.

Transactions of the American Institute of Mining Engineers. Vol. 19. May, 1890, to February, 1891, inclusive. R. W. Raymond, Secretary, 13 Burling Slip, New York City.

TRADE CATALOGUES.

Industrial Railways. C. W. Hunt Co., 45 Broadway, New York City.

This is a pamphlet illustrating and describing the system of light railroads and rolling stock built by this company, at greater length than they are described in the preliminary catalogue recently mentioned in this column. One of the chief peculiarities of the track system and wheels is that the wheel flanges are placed on the outside, and on very short curves special rails are provided. By these devices the vehicles on a gauge of 21½ in. run around curves of 12 ft. radius, although 20 ft. is recommended where space will allow.

The Marshall Car Wheel and Foundry Co., Marshall, Tex., issues a pamphlet containing accounts of the Pennsylvania Railroad Co.'s drop testing machine for car wheels, and other matters of a similar nature; also a number of letters testifying to the excellent quality of the product of those works.

The Treatment of Waters Used in Locomotives to Prevent Incrustation.

BY MR. J. M. BARR.*

The result of my observations, both as to the chemical treatment and as to mechanical devices, is that they are all more or less beneficial, but that in nearly every case the use of both or either has been decided to be unsatisfactory; and I am strongly inclined to believe that this conclusion has been arrived at from the improper and unintelligent use of the methods.

The writer does not propose to go into any general

WATER SUPPLY—EAST END PRAIRIE DU CHIEN DIVISION.

Miles from Milwaukee.	Station.	Source.	Total solids by evaporation.	Total solids by analysis.	Incrusting matter.					Non-incrusting matter.			Pounds of Incrusting matter in 1,000 galls. water.	Boiler compound necessary in 1,000 galls. water, pint.
					Oxides.	Ca Co ₃	Ca So ₄	Mg Co ₃	Total.	Alkaline Sulphates.	Alkaline Chlorides.	Total.		
0	W. Milw'kee. 14.3	L. Mich.	7.00	7.44	0.09	4.40	0.31	2.08	6.88	0.28	0.28	0.56	0.98	1.5
11.3	Brookfield. 6.4	20' well, 10' diam.	21.23	22.63	0.06	9.00	3.28	9.64	21.38	0.61	0.61	1.25	3.05	5
20.7	Waukesha. 7.8	14' " 10' "	28.50	29.64	0.19	7.44	9.80	9.10	26.53	2.54	0.57	3.11	3.79	7
28.5	Genesee. 8.1	14' " 10' "	20.02	20.83	0.09	8.93	2.62	6.86	18.50	1.43	0.90	2.33	2.64	4
33.6	Eagle. 14.3	40' " 6' "	26.99	26.26	0.10	9.72	3.81	8.17	21.80	2.12	2.34	4.46	3.11	5
50.9	Whitewater.	Cravath Lake.	13.85	15.29	0.09	5.73	.....	7.30	13.12	{ Na ₂ Co ₃ = 1.29 0.65	0.23	2.17	1.87	2½
62.2	Milton. 8.5	60' well, 10' diam.	15.78	17.73	0.08	9.52	.....	6.25	15.85	1.40	0.48	1.88	2.26	3
71.0	Edgerton. 9.3	28' " 12' "	33.96	35.44	0.13	13.27	4.32	13.73	31.45	0.83	3.16	3.99	4.49	7
80.8	Stoughton. 15.3	30' " 12' "	23.24	24.57	0.13	12.78	.....	8.48	21.59	2.17	0.71	3.18	3.05	4.5
96.1	Madison.	800' art. well.	14.91	16.86	Trace.	8.51	1.02	7.05	16.58	.....	0.28	0.28	2.37	3.5

detached like a laced belt?" These examples of the questions are enough to give a hint of the scope of the book. Suffice it to say, if anybody wants to know anything there is a chance of his finding it here.

The Steamloop, by Walter C. Kerr, is a pamphlet reprinted from *Journal of the Franklin Institute* describing the interesting connection which is now frequently

discussion, but the intention is to present some cases in which the use of boiler compound has resulted in great benefit. With this object in view, the results obtained from the use of boiler compound on the Prairie du Chien Division of the Chicago, Milwaukee & St. Paul Railway Co., extending from Milwaukee to Madison, Wis., are presented.

The composition of the compound which is used is as

* From a paper read at the October meeting of the Western Railway Club.

follows, and is given in the quantities in which it is made at the West Milwaukee shops: 3,750 gallons water, 2,600 lbs. 70 per cent. caustic soda, 1,000 lbs. 58 per cent. soda ash. The above mixture forms nearly a saturated solution of the caustic soda and soda ash, and costs about 4 cents a gallon.

The foregoing table is an analysis of the waters which are used on the division between Milwaukee and Madison, showing the incrusting and non-incrusting impurities, and the amount of boiler compound required to eliminate these impurities.

The amount of boiler compound given in this table is really one-fourth of what is chemically required to precipitate the impurities given by the analysis. This is due to the fact that the soda ash or bi-carbonate of soda is regenerative in its action, the action being as follows: The carbonate of soda extracts carbonic acid from the bi-carbonates of lime and magnesia, causing them to precipitate, and forming bi-carbonate of soda. At this point the chemical action is complete, and the bi-carbonate of soda is no longer active, but the latter possesses the quality of having the additional carbonic acid driven off by the heat of the waters of the boiler, forming again a carbonate of soda, the same as when originally introduced in the boiler. In this condition it again acts on the bi-carbonates of lime and magnesia, reducing them to carbonates and precipitating them. This action ought theoretically to continue an indefinite number of times, but on account of blowing off, and of the presence of other impurities besides the carbonates of lime and magnesia, which absorb some of the carbonate of soda, we find that practically a given amount of carbonate of soda will regenerate about four times.

Below is a statement of the amount of water consumed by the passenger engines between Milwaukee and Madison, and the number of quarts of boiler compound required, assuming, as above, that the compound regenerates four times.

WATER STATION AND RUNS.	Gallons water taken.	Total water consumed.	Quarts comp. required.	Quarts comp. supplied.	Place put in.
Milwaukee to Madison.					
Whitewater	2,112		2.64		
Madison	2,048	4,160	3.58	4	Milwaukee.
			6.22		
Madison to Milwaukee.					
Whitewater	1,984		2.48		
Milwaukee	2,240	4,224	1.68	4	Madison.
			4.16		

With the use of the boiler compound as indicated in this statement we are able to prevent entirely the formation of scale in the boiler. One engine on this run has made 122,000 miles up to Oct. 1, 1891, and a careful inspection of the boiler shows that it is to-day as clean and free from scale as the first week after having gone into service. At the same time not one dollar has been spent on its firebox or for flue repairs during this period.

Careful attention must be paid to washing out to prevent the accumulation of the granular precipitate, which is formed by the use of this boiler compound, its physical action being to deposit the impurities of the water in a fine granular condition instead of in the form of incrustation. This must be removed, and it is possible on this point that the use of a great many boiler compounds have been decided to be failures. We find that with the engine referred to above it is necessary to change the water every 600 miles and wash the boiler out every 1,200 miles. In addition to this, the engineer uses the blow off cock when the water gives any decided indications of foaming. The above statement shows the treatment received by the locomotive referred to, which has made 122,000 miles, and which, so far as observation is concerned, may make as many more miles before there is any occasion to do any work on the firebox or flues. So far as to what may be the actual expense of maintaining the firebox and flues, our information is incomplete, and this point can only be determined by subsequent developments; but the above establishes clearly the fact that, with the water as shown, boilers can be run for over 122,000 miles, and at the end of this service remain in apparently just as good condition as the day they went into service and without any expenditure for boiler repairs.

We are now extending systematically the use of this boiler compound to other divisions, as is shown in the attached report from E. M. Herr, Division Master Mechanic. The analyses of all the waters referred to in this report are not attached, as they would make the report unnecessarily cumbersome, without adding any additional information.

The boiler compound is applied in the roundhouse, introducing the total amount required for the run into the tender, even if water is taken at one or more intermediate stations. The practice of placing cans on the engines and depending on the engineers to use the boiler compound as required has not proven a satisfactory method of procedure.

The tendency of engines to foam when using this boiler compound has been a great bugbear with the engineers, and we are not able at present to speak positively on this subject. However, the results of our observations would seem to indicate that the foaming is not due simply to the presence of the boiler compound, but is caused by the precipitated impurities clogging the water. Bearing on this matter of foaming, the reports of four engineers are attached, which throw considerable light on the subject, as giving the result of actual observation on the road, and which go very far toward sustaining the opinion advanced above as to foaming. I give them for what they are worth without fully indorsing all that is said.

In Mr. Herr's statement attached you will notice that on the run from Chicago to Savannah 18 quarts of compound are required for freight engines, but that at present we are only using nine quarts. The condition of these engines is not satisfactory, and we are gradually increasing the amount of compound used. At present I am not prepared to say whether waters requiring this amount can be treated successfully, but I am strongly inclined to believe that they can, and I will very likely be able to furnish definite information upon this point within a year. After this point is fully established we propose to take up some waters in the West which are much worse than any shown in this report, but I think

that success in the satisfactory treatment of these waters by this process is quite problematical.

It will be noticed from the above that in the handling of this compound, or in the use of any other compound or device for preventing incrustation, the details must be carefully worked out, and that as much care and attention must be given to this matter as to any other of the numerous operations on a railroad in order to reach success. Attention should also be called to the fact that with the various water supplies the character of the water frequently changes, thus necessitating a change in the amount of compound required. This necessitates a careful watch of the boilers. They should be inspected at every washing to determine if there is a tendency to the formation of scale; and if any tendency of this kind is detected, the quantity of the compound used should be increased until the formation of scale is again overcome. Unless this care and attention is given the matter, the use of this compound will be at the best inefficient and possibly useless. [The Appendices mentioned will be published later.—EDITOR.]

The Electric Headlight.

The use of electric headlights, which, as heretofore noted in these columns, has been gradually extending has now become quite general in Indiana, nearly all the roads entering Indianapolis now having several in service. The Cleveland, Cincinnati, Chicago & St. Louis is the principal exception.

During the past two years the manufacturers of this light have been at work simplifying and perfecting it, certain imperfections having been developed. It is now claimed that all defects have been cured. A representative of the *Railroad Gazette* made a trip over the Indianapolis, Decatur & Western from Indianapolis to Decatur last week on an engine equipped with the light. Its power is approximately 2,500 candle power, and it gives the engineer a light which on a straight track will often reveal objects at a mile or more, and for fully one-half a mile all objects of the size of a cow can be distinctly seen in ordinary weather. The greatest distance at which an object was seen was 2½ miles. This was a window of a station house in which no lamps were burning. When the light was first reflected from the window the appearance was that of a locomotive headlight about a mile away. The window seemed to increase in size until at a distance of about three-quarters of a mile the effect was that of a burning structure. At this distance the outlines of the building could be distinctly seen. These distances were easily computed by counting the telegraph poles, which are 200 ft. apart on this road. A water tank was sighted at nearly a mile, appearing much larger than it really was. Bridges with overhead trusses could be seen at half a mile. The highway crossing fences along the line had been freshly whitewashed and with little effort could be seen a mile.

The most curiously interesting experience was that of running toward the eyes of a rabbit apparently a few hundred feet in advance, but in reality a quarter of a mile. The first impression given was that of a switch light, which on nearer approach looked like a bright piece of metal about a foot in circumference. On this road, where all passenger engines are equipped with the light, the use of switch lights is deemed unnecessary, it being an easy matter to discern the targets at a quarter of a mile. This is not done, however, because the headlight in any way dims the smaller lights; on the contrary, the more powerful electric light seems to intensify the colors, as was demonstrated by running through the yards at Indianapolis and Decatur, and also in approaching railroad crossings where such lights are used.

Some railroad men have considered the light too bright when trains meet each other, and have feared a liability to confuse approaching engineers in determining which train should take a siding. In such a case the lamp is temporarily extinguished by the side-tracked train until the opposite train has passed, and then turned on again. During the whole night not the slightest difficulty was experienced in handling the light. It was steady, and the motion of the engine did not cause it to "flicker" or become unsteady in the least. The engineers on this road, as well as those on the other roads centering at Indianapolis, stated that they had not encountered difficulties with the light. In foggy weather the same proportion of increased illumination is obtained. Collisions have been prevented on the I. D. & W. by the use of these lights. In one instance freight cars had been blown on to the main track during a wind storm, but the engineer saw them in time to stop. In another case, where a switch stand was obscured by a fence, the engineer saw by the switch rails that the switch was misplaced and stopped without running into a string of cars on the side track. Next to the I. D. & W. the C., H. & D. has the largest number of these lights in use, while the passenger engines of the "Monon" are equipped, as well as many of those on the "Vandalia."

The expense of running the light is nominal. The demand for steam from the locomotive is small, and the carbons, which last 18 hours, cost but 70 cents per 100. From an economic standpoint the light is apparently a success. It is manufactured by the National Electric Headlight Co., of which Mr. R. B. F. Pierce is President, with headquarters at Indianapolis.

The Most Popular Lie of the Season.

"Miss Ida Hewitt is the only regularly commissioned and regularly employed woman railroad engineer in the world, and West Virginia has the honor of having produced her. She is good looking, well educated, 23 years old and a blue gray eyed

blonde. She is the daughter of Charles H. Hewitt, one of the chief owners of the short line which connects with the Baltimore & Ohio at Cairo, W. Va. During her schoolgirl days she passed most of her leisure time in the railroad shops near her father's residence, and not only grew familiar with every detail of an engine, but became very much interested in the work. After graduating from the high school her favorite amusement was to ride in the cab, and when one day the engineer was sick she managed the train, and did it so well she was soon given a regular run. It is a narrow gauge road, and one of the prettiest sights on it, they say, is Miss Ida, with a natty engineer's cap and a neat-fitting suit of blue woolen, as she sits in the little cab."

The fact that error travels faster than anything else in the world receives a particularly striking illustration in the case of the above bit of fiction. The story was sent to this office by a correspondent about Sept. 10, and in our issue of Sept. 18 was printed, after being edited as below; but since then it has appeared, in all its glory, in about every daily, weekly or monthly sheet in the United States that has a "scrap" column. It has served to entertain (3) the readers of secular, religious, scientific and even technical papers; the railroad papers, which ought to know better, apparently swallowing it as quickly as any of the rest.

The fascination with which this kind of story appeals to the scissors editor is perhaps largely due to the opportunity it gives for changing the details and thus getting a little training as a regular romancer; but we submit that the addition of the "neat fitting suit of blue," thus necessitating the sacrifice of that beautiful clause about Miss Ida's contract to take a 200-ton engine and haul a train of 500 cars to the Chicago World's Fair, is decidedly mean. If there was not space enough for the whole, the World's Fair ought to have had the preference. Everyone knows that blue blondes wear neat fitting suits, but possibly this editor (the tri-colored clause has not appeared in previous versions) meant to say gray blonde with blue eyes instead of blue blonde with gray eyes. Nonsense aside, however, we certainly advise the pantenees of track tanks to look out for their business. If pump houses are to be manned with blondes of blue, gray or any other tint no runner will favor any system of taking water without stopping.

[From the *Railroad Gazette*, Sept. 18.]

The pretty little romance about "A Woman at the Throttle," on the Calro & Kanawha Valley Railroad, in West Virginia, proves to have a slight basis of fact. Miss Ida Hewitt, the daughter, not of a "heavy stockholder," but of a farmer, tends the stationary engine at a pumping station. It is doubtless true that, as the story states, she has no mean ability as a machinist; but, on the other hand, it is only fair to say that the engine of a pump house is seldom mean enough to make very pressing demands upon the mechanical skill of its custodian. Miss Ida "makes her daily run with as much regularity as the most veteran engineer," but the run is only from her dwelling to the pump house.

TECHNICAL.

Manufacturing and Business.

Mr. A. M. Morse, until recently of the firm of English, Morse & Co., of Kansas City, has removed to St. Louis, Mo., with offices in the Commercial Building, corner Sixth and Olive streets. Mr. Morse has been located in Kansas for eight years, and has designed many of the steam power plants in the Southwest for electric lighting, electric railroads and manufacturing purposes. He has organized the firm of A. M. Morse & Co., who will represent leading manufacturers of high grade steam engines, and also boilers, steam pumps and other apparatus for complete steam power plants. The firm is prepared to design and furnish complete steam power outfits for any service, and for the improvement and extension of plants already established.

The Engineering Equipment Co. has removed its New York offices from the second floor of the Central Building, 143 Liberty street, to the store premises on the ground floor in the same building. It has Boston salesrooms at 126 Pearl street. The company was incorporated last February, the following being now the officers: F. L. Perine, General Manager; A. L. Tinker, Secretary and Treasurer; C. J. Field, M. E., Consulting Engineer; Albert C. Hale, Ph.D., Chemist to the Company; F. A. Magee, M. E., Manager of the Boston branch; W. F. D. Crane, M. E., in charge of the railroad department at New York; C. S. Merrill, representing the Underwood belting, and others.

The Aerated Fuel Company, of Springfield, Mass., has begun suits in the United States Circuit Court for the District of New Jersey against a firm of manufacturers in that state, for making and selling apparatus alleged to infringe the company's patents, and against two glass manufacturing companies for using such apparatus. The company claims that its patents cover the whole system of burning oil with compressed air, automatically regulated. W. S. Collins, Drexel Building, New York, is the sole licensee for the system in Southern New York State, Eastern Pennsylvania and other Middle States.

The Duplex Street Railway Track Co., of 51 Wall street, New York, will commence laying its system of duplex track on Fourth avenue, New York, at about Eighth street, during the present week, on the horse car line of the New York & Harlem road. The principal feature of this system is the under and over lapping at the joint.

The American Foundry Co., of Edison, Wash., is to erect a plant for the manufacture of car wheels.

The East Street shops, built by William N. Whitney at Springfield, O., at a cost of \$1,500,000, causing his failure soon afterward, have been sold at public sale for \$200,000 to Scott Bonham, a Cincinnati attorney, who is believed to represent a syndicate.

The Prescott Steam Heating Co., S. C. Poole, President, has been organized in Illinois to manufacture car-heating apparatus.

The Thayer & Britton Co., of Chicago, has been incorporated to manufacture car and locomotive bearings and railroad supplies. The incorporators are: F. W. Thayer, F. H. Britton, Louis Danziger.

The Acme Railway Switch Co., of East St. Louis, has been organized to manufacture the automatic lock-gear railway switch. The incorporators are: J. E. Chambers, George Broach, Charles E. Long.

The Pittsburgh Reduction Co. announces that it has received from the German Government an order for cups, cartouche-boxes and linings for knapsacks, the object

being to lighten the burden of the common soldier. Five hundred tons of metal will be used.

Iron and Steel.

The Pottsville Iron & Steel Co. has lighted up its No. 3 furnace at Pottsville, Pa., after a suspension of three months. The company blew out all its furnaces shortly after the strike at the rolling mill in July. The firm proposes lighting up its other furnaces as soon as needed repairs can be made.

G. C. McDonald, proprietor of the St. Louis Steam Forge & Iron Works, has purchased two of the furnaces in the old Laclede Rolling Mills at St. Louis, now being torn down, and will re-erect them in his mill.

A proposition has been submitted to the stockholders by the Woodstock Iron Co., of Anniston, Ala., for a loan of \$2 per share of stock to be used in improving and operating its two coke furnaces at Anniston.

The Maryland Steel Co., at Sparrow's Point, Md., which some time ago put in some Wells' lights, have just ordered several more from the manufacturers, Messrs. Keegan & Halpin, 44 Washington street, New York City.

The Reading Rolling Mill Co. has received the contract to furnish all the iron and steel work to put up Machinery Hall, on the grounds of the Columbian Exposition at Chicago.

The Keystone Bridge Co. has secured the contract to construct an iron roundhouse, machine shops and other terminal buildings for the Noyana Railroad at Santos, Brazil, and is also making a number of bridges for Brazilian roads.

O. W. Potter, of Chicago, has bought a half interest in the iron manufacturing firm of Woodruff & Co., of Elgin, Ill. The C. H. Woodruff Co. has been organized with Mr. Woodruff, President, and Julius Clarke Daniels, Secretary and Treasurer. The business will be largely extended.

Shop and Station Notes.

There is prospect of long litigation between the city of Toronto and the Canadian Pacific, over the removal of the Canadian Pacific shops from Parkside to Toronto Junction. In 1877 the city gave the Credit Valley Railroad a bonus of \$250,000 on condition that the shops would be maintained in Toronto. It is stated by the city officials that the Canadian Pacific having assumed the obligations of the Credit Valley road is compelled to maintain the shops in the city. The city will probably sue to recover a half a million dollars.

A passenger station, 75 ft. in length and 24 ft. in width is to be erected at Edison, Wash., on the Pacific division of the Northern Pacific. The estimated cost is \$28,000.

There is some probability, according to recent statements of Henry Villard, that a new passenger station will be erected by the Northern Pacific in Tacoma, on the site of the old railroad shops. The estimated cost of the new depot is \$250,000, of which \$80,000 will be spent on the train sheds.

Plans have been prepared for two large freight houses for the Cleveland, Cincinnati, Chicago & St. Louis road at Indianapolis. Each is to have a capacity of loading and unloading 100 cars at a time. The length of each building is to exceed 800 ft. The structures will both be of brick with stone foundations. On the street front end each will be three stories high, the upper portions to be utilized as offices.

Interlocking.

The Illinois Railroad Commissioners at a meeting held last week ordered interlocking signals to be put in at the crossing of the Wabash, the Chicago & Alton and the Jacksonville Southeastern at Jacksonville, where there had been considerable negotiation as to the division of the expense. It was finally agreed that each company should pay one third of the first cost, the division of running expenses to be fixed later by the Commissioners. The Commissioners have also ordered interlocking at Paducah Junction, near Pontiac. Interlocking plants for the crossing of the Chicago & Alton with the Atchison, Topeka & Santa Fe at Corwith and at the crossing of the Alton with the Belt Line road of Chicago are under consideration. The Board has just approved the interlocking at the crossing of the Rock Island and the Burlington at Ottawa. There are now 41 grade crossings in the state equipped with interlocking signals.

The Northern Central has put in a new 74-lever interlocking system at the mouth of the tunnel near the union station in Baltimore. A new iron bridge has been built across Jones' Falls at the same point, and two new main tracks have been added. The interlocking machine was put in by the Union Switch & Signal Co.

Fire Proofing.

A test of fire resisting coverings for walls, partitions, etc., took place recently at Boston, Mass. Cells or compartments, built of 2-in. spruce plank covered with fire-proof materials, were placed in a vacant lot. Samples from the following companies were used: New York Eastern Plaster Board Company, manufacturing cellular blocks composed of vegetable fibre and plaster of paris; Stark, Edison & Co., manufacturing a fire-resisting wash called albamural; Magnesio-Calcite Fire-Proof Company, manufacturing a fire-proof paper; King's Windsor Cement Dry Mortar Company; the Clinton Wire Cloth Company; and the New Jersey Wire Cloth Company. Kiln dried hickory fuel was placed within the cells to a depth of four feet and thoroughly wet with kerosene. The cells resisted the flames admirably, and the experiment was considered eminently satisfactory.

Elevation of Tracks in Chicago.

At a meeting of the Chicago City Council last week the ordinance known as the Torrence Terminal was taken up and passed by a vote of 48 to 4, the Council thus taking the first step in favor of the elevation of railroad tracks. The company is to give a bond of \$200,000 for the performance of its duties under the ordinance and is obliged to deposit \$100,000 with the City Treasurer until two miles of track have been constructed. As the ordinance has already been approved by the Mayor there is little doubt that he will sign it.

The Movable Sidewalk.

The Multiple Dispatch Railway Co. has succeeded in running its movable sidewalk at the World's Fair grounds after some delay caused by inferior workmanship and the usual amount of misunderstanding which is inseparable from new work of this sort. The power of the motor trucks has been increased by augmenting the adhesion, and a better lubrication of the top rail has reduced the resistance so that the apparatus runs with comparative freedom. Some little trouble has been experienced from derailment, but on curves this is being removed by guard brackets. This week the apparatus will be put in full operation, and the trial of endurance and tests for practicability will commence.

West Superior Shipyard.

The American Steel Barge Co., of West Superior, Wis., has commenced work on a dry dock at its shipyard at West Superior. This dock, which will be the largest on the lakes, will be 500 ft. long, 100 ft. wide and 20 ft. deep. There will be used in its construction 20,000 piles and over 2,000,000 ft. of lumber. This dock will accommodate two large lake steamers at one time, and will be the only one at the head of the great lakes, the nearest one being located at Port Huron, 700 miles to the east. It will also be situated at the terminus of the lines where the vessels discharge their cargoes, and they will be able to go into dry dock without delaying freight or running a long distance light.

This company has decided to engage in the construction of all classes of vessels as well as the "whalebacks." It now has under construction six freight vessels of the "whaleback" type. All of them are to be over 300 ft. in length. Work will soon be commenced on a passenger steamer which will be 500 ft. long, 45 ft. wide, and will be propelled by twin screws operated by engines having a capacity of 6,000 H. P. This vessel will be ready to launch when navigation opens in 1893; will carry 1,000 saloon passengers, and will cost \$600,000. This company has been in operation a little over two years, and, when the lakes open in '92, will have a fleet of "whalebacks" capable of carrying 800,000 tons of ore to eastern lake ports during the season.

An Edison Electric Street Railroad.

Charles M. Gibson, of Schenectady, N. Y., has secured the right of way for the electric railroad from Fonda to Johnstown and Gloversville, N. Y. The road will be 14 miles long and will cost \$18,000 a mile to construct and equip. Mr. Gibson has interested Mayor Smith, of Schenectady; A. Comstock, of Ballston, N. Y.; Thomas C. Freny, of the Edison General Electric Co., and a number of New York capitalists. Daniel B. Judson and A. J. Zimmer, of Gloversville, are also interested in the project. The Edison system will be used.

A New Steamship Line to Philadelphia.

The first steamship of the newly organized "Mexican International Steamship Co." will probably sail from Philadelphia for Vera Cruz, via Havana, Progreso and Tampico in January. Steamers will thereafter be dispatched every two weeks. The ships of this line are to be of 2,500 tons capacity, with limited passenger accommodations, and will have a speed of 13 knots an hour. Already contracts have been entered into for guaranteed space for 1,000 tons of outward cargo each semi-monthly sailing. The Standard Oil Co. is said to have agreed to send 1,500 cases of refined petroleum per month, and one firm in Cuba has promised 1,000 tons of sugar every 30 days. The entire capital has been raised in Philadelphia. The company has elected Mr. William Bement President, Mr. George E. Bartol Secretary, and Mr. James W. Porch, General Manager.

Proposals for Tunnels.

The Chief Engineer of the Arrowhead Reservoir Co., San Bernardino, Cal., will receive until Dec. 15 proposals for the construction of three tunnels—one of about 2,000 ft. in length, the second about 1,000 ft. in length, and the third about 5,000 ft. in length—through rock, in accordance with plans and specifications on file.

The St. John Harbor Improvements.

The Public Works Department of St. John, N. B., last week discussed the proposed harbor improvements on the West side, the cost of which is estimated at from \$175,000 to \$200,000. It was decided to advertise for tenders, which will be submitted to the Common Council.

A Long Iron Ocean Pier in Columbia.

The Bureau of the American Republics is informed of the progress which is being made in the construction of the ocean pier at Puerto Columbia, the new seaport five miles west of Savanilla, and which is in direct communication by rail with Barranquilla. The pier when finished will be 4,000 ft. long, built entirely of iron and steel, with double line of rails its whole length, and reaching a depth of water sufficient to receive alongside the largest ships afloat. Six to ten ocean steamers can be moored at the same time, and hydraulic lifts, will be erected for handling the cargoes. Already 2,000 ft. have been finished and the pier is actually open for business to ships drawing 22 ft.

Carnegie's Plate Mills.

The 119-in. plate mill at Homestead turned out 4,800 tons of finished iron during the month of October, according to the Pittsburgh Dispatch. This was done by the crew working at a regular pace and without extraordinary effort. Five thousand two hundred tons were finished during one month in 1890. A Scotch steel maker who visited the works said that they rolled four plates there to one in the old country; and in addition the steel was not rolled so hot as in Scotland.

The Reorganization of the United States Rolling Stock Co.

The attorneys representing the United States Rolling Stock Co., acting with the creditors' committee appointed at the meeting at 29 Nassau street, New York, last week, have issued a circular to the creditors who have not yet approved the reorganization plan, explaining the terms agreed on.

A new company is to be organized and the assenting shareholders of the old company have agreed to subscribe \$500,000 in cash in order to furnish working capital for the new company and meet the requirements of the reorganization, and have agreed to take for such cash second mortgage bonds of the new company at par. The securities of the new company will be:

First mortgage five per cent. bonds, \$1,750,000; second mortgage five per cent. bonds, \$2,000,000; collateral car trust bonds, \$1,000,000; preferred stock, five per cent. non-cumulative \$1,750,000, and common stock, \$1,750,000.

The liabilities of the old company are given as follows: Real estate bonds (secured by first mortgage on Hege- wisch property), \$250,000; consolidated general mortgage bonds, about \$1,125,000; six per cent. debentures, about \$970,000; collateral car trust bonds, about \$970,000; general indebtedness, including receiver's certificates issued at par, \$252,826; present indebtedness of receiver (estimated), \$25,720, and capital stock, \$4,000,000.

The committee has offered to the holders of receiver's certificates and creditors entitled to certificates under order of court, the privilege of participating in the proposed reorganization, if consummated, on the following basis: Thirty per cent. of principal of claims in cash; 20 per cent. in first mortgage bonds; 20 per cent. in second mortgage bonds, and 30 per cent. in preferred stock. The creditors' committee is composed of Thomas A. Griffin, William H. Fenner, Jr., John Caldwell, William McConway, and Henry D. Laughlin.

Steel Ship-Building in Canada.

Capt. J. B. Fairgrieve has about completed arrangements for the construction of a steel steamship, at Hamilton, Ont., this winter. The vessel is destined for the general freight traffic between Montreal and Lake Superior points. She will be 180 ft. long, the full capacity of the St. Lawrence canals, and will be built of Scotch steel. The cost of the boat will be about \$60,000. She will be 1,200 tons burden, and will be finished by May 1, 1892.

The "Comox" the first of the steel steamers built at Vancouver, B. C. by the Union Steamship Company, was launched last week. This is the first steel vessel built north of San Francisco.

Mica Discoveries in Canada.

A mountain of mica is reported to have been discovered on the Canoe River, about 300 miles north of the British Columbia boundary line, by Julius V. Fleming, of Kamloops, B. C. Should the find be what the discoverer anticipates, it will be far ahead of the richest gold mine.

Westinghouse Brake in Germany.

The commission of railway engineers has, as we hear, declared in favor of the universal adoption of the Westinghouse brake on the German railways, and its introduction is already occupying the attention of the authorities.—Kuhlows.

Locomotive Driving Tires.

The Midvale Steel Co. has issued a circular from which extracts follow: "Our attention has recently been called to a paragraph in the Railroad Gazette, in which the statement is made that the Chicago, Milwaukee & St. Paul is now using Krupp steel tires instead of domestic or other foreign makes, notwithstanding that the American tires may be purchased for one-third the price of the Krupp's." It also goes on to make a number of statements in disparagement of American tires which, if allowed to pass uncontradicted, may serve to bias the minds of some railroad men against all tires of American manufacture. While it is not so stated, it is left to be inferred that the C. & M. & St. P. R. R. have used all brands of American tires, and that all have failed on the road, and, as a consequence, all American tires are ruled off the road. We wish to be distinctly understood as saying:

"First—That the Midvale tire is an American tire.

"Second—That it has been largely used on the C. & M. & St. P. R. R.

"Third—That it is now being used on the C. & M. & St. P. R. R., and that we have supplied Midvale tires to that road within two weeks from this date; and further, that our sales of tires to the C. & M. & St. P. R. R. for the year 1891 are fully up to the average of our sales to that road for the past five years, despite the facts that the present year has been an unusually dull one, and that the C. & M. & St. P. R. R. began the year with an unusually large stock of tires on hand. We venture to say that the record made by Midvale tires on that road will compare favorably with the record of Krupp or any other make, and that Midvale tires will be used on that road long after Krupp and all other foreign tires have been ruled off this continent.

"Fourth—That the Midvale Steel Co. are steel-makers as well as tire-makers and are thus enabled to control their product, and by observation and investigation to improve it. We know full well that there are plenty of inferior American tires made, as there are also plenty of inferior German tires. We know, for instance, that castings rolled in the shape of tires without being forged in any way are masquerading as American tires, and are being palmed off on the unwary as such; but we must decline to be held responsible for them, or to be classed with them in any way. We know, and you know, that tires are sold as American tires that have been made by concerns who are not steel-makers in any sense of the word; who do not and cannot know what is put into them or how they are made and by what process—Bessemer, open-hearth or crucible—and the purchaser simply takes 'pot luck' with the manufacturer. We must respectfully decline to be held responsible for this class of material also."

THE SCRAP HEAP.

Notes.

Several more ticket sellers have been discharged by the Lake Shore & Michigan Southern.

A Denver paper states that the demand made by Railroad Commissioner Hamill, of Colorado, upon the railroads, for copies of traffic contracts, is coolly ignored by the railroads.

A passenger train on the Missouri Pacific was "held up" only two or three miles out of Omaha on the night of Nov. 4 and the passengers and the express messenger were robbed of \$6,000.

A press dispatch from Rio Janeiro, Brazil, Nov. 8, says that a government decree, just issued, orders a lease of the state railroads for 33 years at a gold rental, half of which is payable in advance.

The Lyons & Fulton Transportation Co. has been organized to establish a boat transfer for freight and passengers from Lyons, La., to Fulton, Ill. The transfer will be used by the Chicago, Burlington & Quincy.

It is reported that several thousand coal miners have struck in Indiana, and that a falling off of shipments from this region and from Pittsburgh has produced a troublesome scarcity in coal for steam vessels at Chicago.

The Wiggins Ferry Co., of St. Louis, which readjusted the wages of engineers and firemen a short time since, discharged 20 men last week for refusing to work during the dinner hour. The men claim that in this action the company violates the contract.

In the Superior Court at Evansville, Ind., last week, the jury in the case of William M. Christie against the Louisville, Evansville & St. Louis road, awarded the plaintiff \$14,500 damages for a breach of contract as to freight rates and for unjust discrimination.

A man has been arrested in New York for robbing freight cars on the West Shore, who belongs to a gang which is said to have been at work several years. They know enough to pick out valuable goods, such as drugs worth several dollars a pound. It is believed that they had false sealing irons.

The "Alley" Elevated road in Chicago will be equipped with the Black switch and target on all turnouts and crossovers. This switch is used on the Manhattan and the Brooklyn elevated roads, and is the design of Mr. Black, Roadmaster of the Manhattan. This device combines the use of a positive lock, switch and detector bar and a target, all operated with one movement of one handle.

At McDonald, Pa., where very productive oil wells have lately been opened, the increase of both passenger and freight traffic has been so sudden and great that

the Pittsburgh, Cincinnati, Chicago & St. Louis has been overwhelmed, and notice has been given that shipments of crude oil cannot be taken at that station until increased facilities and safeguards against danger from fire can be provided.

The passenger department of the Lake Shore & Michigan Southern issues a circular announcing the renumbering of the through passenger trains in the order of their times of starting. This would seem to be in the direction of breaking up the present arrangement by which each through train bears the same number over several different roads, as for instance from New York and Boston through to Chicago.

World's Fair Notes.

The Committee on Electricity has decided to light every fair building in Jackson Park with electricity.

A temporary power-house has been finished, which will furnish power for three 1,000,000-gal. pumps to be used for fire protection.

The average number of mechanics and laborers employed during the month of October was about 3,000. This force will be almost doubled during November.

At the regular monthly meeting of the Western Society of Engineers a paper was read by Mr. A. Gottlieb, defending his work in putting in foundations for the World's Fair buildings at Jackson Park. A disagreement with Chief of Construction Burnham and other World's Fair authorities led to Mr. Gottlieb's resignation as Chief Engineer of the Columbian Exposition. Mr. Gottlieb claims that his work was in line with the best American practice.

A Cable Road up the Catskills.

A company has been organized to build an inclined railroad one and a quarter miles long, from the terminus of the Catskill Mountain Railroad near Palenville, N. Y., up the mountain to within an eighth of a mile of the Catskill Mountain House. It will be operated by cable, and the ascent will be over 1,700 ft. The road will be called the Otis Elevating Railway Co., and will be built by Otis Brothers & Co., of New York City. The plan is now to capitalize the company at \$100,000, of which Alfred Van Santvoord, President of the Albany Day Line; Charles L. Rickerson, Vice-President of the Catskill & New York Steamboat Co., and the Otis Brothers have promised to take two-thirds. The Catskill people will take one-third. The road will also be bonded in \$100,000. Complete surveys and estimates have been made, and if the necessary stock is taken, ground will be broken at once and the railroad elevator will be ready for use next summer.

Obstructions to Navigation.

Captain Marshall, United States Engineer, stationed at Chicago, has received from Washington an order to instruct the United States District Attorney to institute proceedings in the United States District Court to recover from the city of Chicago a fine of \$5,000 for allowing the Canal street bridge to remain in position one month after the time for its removal had expired. Captain Marshall also received an order to investigate the complaint made by the Chicago Lake Line Agents' Association against the railroad bridge of the Pittsburgh, Fort Wayne & Chicago Railroad Company near 19th street, as an unreasonable obstruction to the free navigation of the river.

LOCOMOTIVE BUILDING.

The Big Four (C., C. & St. L.) is said to be about to ask bids on 20 locomotives.

The Mexican Central is asking bids for three of the big double engines designed by Mr. Johnstone, noted in our issue of Sept. 11. These locomotives have the Johnstone system of compounding. Each of them is essentially two moguls articulated and carries 200,000 lbs. on the drivers.

The Central of New Jersey has this week given orders to the Rogers Locomotive Works, of Paterson, N. J., for the building of 10 heavy freight engines; and to the Baldwin Locomotive Works, of Philadelphia, for two compound locomotives, one for passenger and one for freight service.

The Rhode Island Locomotive Works has about ready for delivery to the Boston & Albany 20 of that road's standard eight-wheel freight engines, and four standard Rhode Island consolidation engines. Eight passenger locomotives for the Chicago & West Michigan, with 17 x 24 in. cylinders, and seven 10-wheelers for the Chicago, Milwaukee & St. Paul are nearly ready for delivery. The company has recently completed the Canadian Pacific order for ten 10-wheel freight engines.

Two more compound engines have been added to the locomotive equipment of the Brooklyn Elevated Railroad, making three in all in use on this road. These were simple engines rebuilt as compound engines by the Rhode Island Locomotive Works. The two just received have been somewhat modified in detail from the first one, with a more simple arrangement of the valve gear. The first engine has through many months of hard service maintained the economy of fuel developed in earlier trials.

The following are the principal dimensions of the locomotives, which are all Forney type: Cylinders, low pressure, 18 x 11½ in.; high pressure, 16 x 11½ in.; diameter of drivers, 42 in.; diameter of boiler, 42 in.; number of boiler flues, 124; length of boiler flues, 68½ in.; the total heating surface is 289.46 sq. ft. The total weight of engines, loaded, is 45,850 lbs.; weight on drivers, 31,534 lbs., and weight on trucks, 14,316 lbs.

CAR BUILDING.

The East Tennessee, Virginia & Georgia, let this week an order for 1,000 cars.

The Ohio Falls Car Co. has delivered the last of the order of 1,000 for the Pennsylvania Company.

The Buffalo, Rochester & Pittsburgh this week received three new four-wheel cabooses.

The Mount Vernon Car Co., of Mount Vernon, Ill., has received a contract from the Mobile & Ohio road to build 200 gondola cars.

It is said that the Cleveland, Cincinnati, Chicago & St. Louis will ask bids on 1,000 freight cars, 25 caboose cars and 50 passenger cars.

The Columbus Hocking Valley & Toledo road has ordered five passenger cars and three palace cars of the Pullman Palace Car Co.

The Pullman Car Co. is said to have about completed at its Pullman shops the Philadelphia & Reading order for 61 passenger coaches and 9,550 box and gondola cars.

The Great Northern has received three new sleepers

from the shops of the Barney & Smith Mfg. Co. They are of the latest pattern and elegantly furnished. Others of the same style will follow soon and will be put into service on the Pacific line.

BRIDGE BUILDING.

Benton Harbor, Mich.—Contracts have been let at \$4,500 to erect an iron viaduct over the Chicago & West Michigan tracks, near the fair grounds in Benton Harbor.

Camden, Ark.—The St. Louis, Arkansas & Texas has completed an iron and steel drawbridge across the Ouachita River, at Camden, Ark., 360 ft. long, and an iron and steel draw 428 ft. in length at Pine Bluff across the Arkansas. The company has also completed an iron and steel bridge across the St. Francis River, on the Arkansas-Missouri division.

Canadia, N. Y.—The Rochester Bridge Works is to put up an iron bridge of 125 ft. span this month at Canadia for the Western, New York & Pennsylvania road.

Columbus, O.—Articles incorporating the Covington & Cincinnati Rapid Transit Bridge Co. were filed in Ohio, Nov. 6. The purpose is to construct a toll bridge over the Ohio River. The incorporators are George Bullock, Stephen B. Burton, Charles B. Simrall, R. W. Nelson and Daniel P. Ellis.

Glencoe, Ont.—The Hamilton Bridge Co., which has the contract for the iron bridge over the river Sydenham, Ontario, on the new railroad from Glencoe to Kingscourt, has completed arrangements in Glencoe for commencing the work. The contractors will begin shipping stone for the abutments this week to Glencoe.

Hempstead, Tex.—The County Court has contracted for three iron bridges, crossing Iron, Clear and Three Mile creeks. The price agreed upon is \$8,400. The Court will issue bonds for payment or six per cent. interest bearing notes.

Huron, Ohio.—John Stang, of Lorain, has secured the contract for removing the abutments of the Lake Shore Railroad bridge at Huron and also for doing the dredging preparatory to building the new abutments. Active work on the new structure will not be commenced until next spring.

Kenova, W. Va.—The centre span of the Kenova bridge on the Norfolk & Western is finished, and this week the next on the Ohio side will be complete. The span reaching the Ohio side will be finished in a couple of weeks.

La Crosse, Wis.—A bridge across the Black River, connecting La Crosse and Trempealeau counties, is being constructed by the Chicago Bridge & Iron Co. The expense is born principally by La Crosse County and merchants of the city of La Crosse.

Madawaska, Ont.—Mr. John Munro is pushing ahead with his contract on the new railroad bridge over the Madawaska. The work of building the piers is progressing, and one of the piers will be over the water line this week. The work of pumping out the caissons is carried on by a 35-H. P. engine operating a pump which has a capacity of 7,000 gallons of water per minute. Over 130,000 ft. of timber and 1,500 tons of iron and spikes were used in the construction of the two caissons in which the centre piers are being built. As a foundation for the masonry 800 yds. of concrete and 700 yds. of stone were used in the two caissons. It will require 1,000 barrels of cement to complete the job. The masonry is being built at the rate of 3 ft. a day, and if the fine weather continues Mr. Munro expects to have the piers ready for the iron work in about a month's time.

McKeesport, Pa.—The Schultz Bridge & Iron Co., of Pittsburgh, has the contract to build a bridge across the Monongahela River from McKeesport to Lynch.

New York City.—The Board of Estimate and Apportionment has allowed \$1,000 for bridges over the Bronx River, and \$1,200 for bridges over Cromwell's Creek, in the Annexed District, north of the Harlem River.

The Commissioner of Public Works has given a favorable report on a proposition to build a steel or iron bridge from the Whitehall street terminus of the elevated road along the east side of South street to the dock of the South Brooklyn Ferry. Plans for the structure were submitted. The ferry company is to build the structure.

Philadelphia.—Bills were introduced last week in the City Council to authorize the construction of bridges over the Richmond branch of the Reading Railroad on the lines of Sixth, Ontario and Front streets.

Ramsey, Ill.—The Commissioners of Highways last week let the contract for the erection of an iron bridge across Ramsey Creek. Seventeen bids were made, but the contract was awarded to the Indiana Bridge & Iron Co., of Muncie, Ind., for \$1,048. The main span is to be 65 ft. long.

Rochester, N. Y.—Contracts for the construction of a lift bridge over the canal at Rowe street have been let by the State Superintendent of Public Works for the superstructure to W. H. Shepherd & Sons, of Havana, N. Y., for \$8,292, and for the substructure to J. & M. McMahon, of Rochester, for \$3,277.

Utica, N. Y.—The contract for the foot bridge across the Erie Canal at Breese street, Utica, has been signed by Dean & Westbrook, New York, the contractors. The cost is to be \$1,525.

Wilmington, Del.—The Baltimore & Ohio Railroad will erect an overhead bridge in Wilmington where its tracks cross Lancaster avenue.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Belleville & Southern Illinois, semi-annual, 4 per cent. on the preferred stock, payable on demand.

Catawissa, semi-annual, 3½ per cent. on the preferred stocks, payable Nov. 18.

Chicago & Alton, quarterly, \$2 per share on the common and preferred stocks, payable Dec. 1.

Cleveland & Pittsburgh, quarterly, 1½ per cent., payable Dec. 1.

East Tennessee, Virginia & Georgia, annual, 2 per cent. on the first preferred stock, payable Nov. 30.

Pittsburgh, Cincinnati, Chicago & St. Louis, 2 per cent. on the preferred stock, payable Nov. 20.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Baltimore & Ohio, annual, Baltimore, Md., Nov. 16.

Boston, Revere Beach & Lynn, annual, Boston, Mass., Nov. 19.

Boston, Winthrop & Shore, annual, Boston, Mass., Nov. 19.

Buffalo, Rochester & Pittsburgh, annual, 36 Wall street, New York City, Nov. 16.

Cleveland & Pittsburgh, special, Cleveland, O., Nov. 18, to vote upon a proposed issue of bonds.

East Tennessee, Virginia & Georgia, annual, Knoxville, Tenn., Nov. 18.

Memphis & Charleston, annual, Memphis, Tenn., and Huntsville, Ala., Nov. 30.

New York, Lake Erie & Western, annual, 21 Cortlandt street, New York City, Nov. 24.

Richmond, Fredericksburg & Potomac, annual, Richmond, Va., Nov. 18.

Richmond & West Point Terminal, annual, Richmond, Va., Dec. 18.

South & North Alabama, annual, Montgomery, Ala., Nov. 28.

Suspension Bridge & Erie Junction, annual, 21 Cortlandt street, New York City, Nov. 24.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings at its rooms in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

Engineers' Club of Philadelphia.

At the meeting on Oct. 17 there were present 53 members and four visitors. The following were elected active members of the club: J. F. Stevens, Mechanical Engineer, 3913 Walnut street, Philadelphia; Carl G. Barth, Mechanical Engineer, Designer with Wm. Sellers

& Co., Incorporated, 1600 Hamilton street, Philadelphia; Edward G. Bennett, Assistant City Engineer, Altoona, Pa.; George H. Perkins, Mechanical Engineer, 413 S. Broad street, Philadelphia; A. J. Menocal, Engineer Nicaragua Canal Construction Co., Rivas, Nicaragua, Central America; Benj. S. Lyman, Assistant Geologist to Geological Survey of Pennsylvania, 708 Locust street, Philadelphia; F. M. Smith, Civil Engineer, with Norfolk & Western, Roanoke, Va.

Captain Spencer C. McCorkle presented the following resolution, which was adopted:

Resolved, That the President be requested to appoint a committee of three to propose measures for bringing the subject of Landlocked Navigation before the Boards of Trade and other commercial bodies of the principal Eastern and Southern seaboard cities, with the view of preparing a joint memorial for presentation to Congress, urging the importance of the subject and praying that the necessary preliminary steps be taken in that direction.

Capt. McCorkle and Messrs. Foster Crowell and Rudolph Herring were appointed as the committee.

Hon. B. E. Fernow, Chief of the Forestry Division of the Department of Agriculture, described the tests of timber now being made under the auspices of that department and urged the necessity for them. The material is to be collected under the direction of experts, and all the data are to be carefully noted, so that not only the section from which the specimen is obtained will be known, but also the entire history of each piece tested.

The subject was discussed by Mr. E. E. R. Tratman and by Mr. T. Carpenter Smith, and a letter from Prof. J. B. Johnson, who is in charge of the work, was read. A number of photographs accompanying the letter, illustrated the method of experimentation. A resolution offered by Mr. Trautwine, that the secretary of the club be requested to address to the Secretary of Agriculture a letter, expressing the club's appreciation of the importance of the extensive series of timber tests now being carried out by that department, and the hope that such appropriations may be granted as will enable the work to be carried on upon the scale projected, and thus insure for it the desired degree of usefulness, was seconded by Mr. Carl Hering, and adopted.

Mr. F. H. Lewis presented a paper on "Soft Steel in Bridges," advocating the use of soft steel on at least an equal footing with wrought iron and medium steel, and numerous tests of the material, in support of the position taken by the author, were presented. The subject was discussed by letter by Mr. C. S. Sims, Jr., and Mr. Chas. S. Churchill, and verbally by Messrs. Henry B. Seaman, E. E. Russell Tratman and James Christie.

The paper on "Cement" was deferred to the meeting of Nov. 21, and the paper on "Fuels" to the next meeting.

Northwest Railway Club—Painting of Equipment.

At the October meeting of the Northwest Railway Club, Mr. J. O. Pattee, Master Mechanic of the Great Northern, read a paper, of which we present a brief abstract.

The foundation of the work of painting passenger equipment is the priming, which should be of the best material, principally of good lead and raw linseed oil. Linseed oil has marked drying qualities; it is capable of drying quickly and at the same time forms that required thin, tough, elastic and adhesive film which is so valuable in all painting when put on in thin coats, as the object is to fill the pores and make a surface for the color; it must also be adhesive and have a proper elasticity, as much difficulty may arise from not giving the lead or priming coat time to dry before covering with another coat. All paint commences to dry at the surface, and if laid on in thick coats and too much dryer is used or it is covered too quickly it will dry unequally and peel off or blister.

In no case should the wood receive a coat of any wash or sizing to fill the pores previous to the coat of lead and oil, as by thus filling the wood and making a smooth surface the oil which is contained in the first coat of priming is prevented from entering the pores and thereby fastening itself firmly, and if the priming is not fastened it will be sure to peel off.

After priming putty must be carefully applied and given time to dry perfectly. The putty must be properly mixed so it will adhere and dry hard without swelling.

Dark cars in which the chief material is burned umber and raw sienna will not admit of a liberal use of oil in the mixing, and they will not stand the weather as well as lighter cars in which more oil can be used. The advantage, however, in those shades is that they have a greater covering capacity, and do not require as heavy coats or as many coats to get the shade perfect.

Light shades are preferable in many instances, as they are more durable on account of the foundation or body being made up largely of lead. Yellow shades will bear more oil in the mixture without cracking, and for that reason are desirable, and all light shades are less affected by the heat. Colors should be selected which are less affected by the heat and a shade over which the varnish shows least when perished. The objection to light colors is that with the present fuel in the northwest (soft bituminous coal) they become tarnished and require washing often, which of course injures the varnish.

Having applied the color, which should be laid on evenly and quickly and well brushed out, we advise putting the lettering and ornamental work on the color in preference to putting it on after receiving one coat of varnish, as the leaf is protected by the entire body of varnish. One coat of good rubbing varnish and two coats of good coach varnish will give good results if proper time is given to dry. We do not recommend mixing any two grades of varnish.

Southern & Southwestern Railroad Club.

The Southern & Southwestern Railway Club will meet at the Kimball House, Atlanta, Ga., on Thursday, Nov. 19, at 10:30 a. m. The subjects to be discussed are as follows:

"Uniformity in Locomotive Performance Sheets, and in the methods of collecting and computing the data embodied in them," to be opened by Mr. Jas. Meehan, Supt. M. P. of the Queen and Crescent.

"Repair Work on Large Systems—should it be conducted in one large plant supplemented by numerous small ones capable of doing light repairs only, or should the work be conducted in several plants distributed over the system, each capable of handling all kinds of repairs," to be opened by Mr. W. H. Thomas, S. M. P. of E. T. V. & G. R. R.

Western Railway Club.

At the October meeting the discussion of Mr. Rhodes' paper on Air Brake Practice was continued, and a paper by Mr. Barr on Boiler Water was read.

Mr. W. H. Marshall was elected Secretary.

The Club will hold a meeting on Tuesday, Nov. 17. The subject for discussion is the Treatment of Water Used in Locomotives to Prevent Encrustation. H. H. Peck will read a paper on Master Car Builders' Standards and Defect Cards.

PERSONAL.

—Mr. John S. Wattles, General Manager of the Sioux City Elevated Railway & Rapid Transit Co., has resigned.

—Mr. William Britton, Superintendent of Bridges of the Panhandle division of the Pennsylvania system, is seriously ill with typhoid fever.

—Mr. George B. Clason, General Manager of the St. Louis & Hannibal, has resigned, and the position has been abolished by President John I. Blair.

—Mr. W. H. Whitaker has resigned the position of Master Mechanic of the Minneapolis & St. Louis. Mr. John Tonge has been appointed to succeed Mr. Whitaker.

—Capt. William Dent, the oldest passenger conductor on the Pennsylvania Railroad, whose record of 36 years is believed to be unequalled, died near Hollidaysburg, Pa., on Nov. 9.

—Mr. James Penny, Treasurer of the Amalgamated Association of Iron and Steel Workers, and one of its founders, died in Pittsburgh, Pa., this week, of blood poisoning. The deceased was 63 years of age.

—The following officers for the Cincinnati Freight Bureau were elected last week: President, Richard Dymond; Vice-President, James J. Hooker; Treasurer, Albert B. Voorheis; Secretary, Chas. S. Maguire.

—Mr. F. B. Seymour has been appointed Superintendent of the Green Bay, Winona & St. Paul road, and Mr. J. B. Last has been promoted to the position of General Freight and Passenger Agent of the same line.

—Engineer C. S. Biehler, who superintended the construction of the new Tacoma repair shops of the Northern Pacific, succeeds Engineer Bedolfe, who has recently resigned as Division Engineer of the road, with headquarters at Tacoma, Wash.

—Mr. John Turner, Superintendent of the Louisiana division of the Illinois Central, has resigned. Mr. Turner began his connection with the Illinois Central over 18 years ago as a train dispatcher, and was soon promoted to be superintendent.

—Col. John A. Wright, one of Philadelphia's most esteemed citizens, died recently in that city, aged 11 years. He was one of the promoters of the Pennsylvania Railroad and a member of its first board of directors and its first Chief Engineer. During the civil war Mr. Wright served on the staff of Gov. Curtin.

—Mr. James Le Mars, the Superintendent of Bridges of the Wheeling & Lake Erie, died at his home in Newark, O., Nov. 7, of heart disease. He was formerly bridge foreman of the Grand Trunk Railway and was at one time connected with Hopkins & Co., bridge builders, of St. Louis, Mo. He had held his recent position since 1884.

—Mr. J. S. Turner, formerly chief inspector New York Air Brake Co., has been appointed Master Mechanic of the third Division Mexican of the Central Railroad, with headquarters at Jimulco. Mr. Turner is a graduate of the Altoona shops and served on the Pennsylvania, and later was Division Master Mechanic on the same division of the Mexican Central to which he now returns. The division is 440 miles long.

—Mr. George Gould has succeeded Mr. R. M. Gallaway as First Vice-President of the Manhattan Elevated, and General Manager F. K. Hain has been elected Second Vice-President. Mr. Gallaway will devote his attention chiefly to banking interests in New York City. He has been Vice-President of the Manhattan for a number of years, and does not now resign from the Board of Directors. He will be Chairman of the Executive and Expense Committees.

—Mr. A. B. Chafee, well known in railroad circles in Canada, died at Brockville, Ont., last week from the effects of a cold contracted a few weeks ago. Mr. Chafee was for years Treasurer of the old Southeastern line, severing his connection with it when it was taken over by the Canadian Pacific. At the time of his death he was President of the new International Railway Guide Co., and was an officer in various insurance companies and other business enterprises in Canada.

—Ex-Governor John Gregory Smith, President of the Central Vermont Railroad, died of heart failure, at his home in St. Albans, Nov. 6. Governor Smith was born in St. Albans July 22, 1818, and graduated at the University of Vermont in 1842. He then took a course in the Yale Law School at New Haven, Conn., but practiced his profession a short time, becoming interested in railroad affairs. His father was a projector and a leading director of the Vermont Central and Vermont & Canada roads, and when he died, in 1858, he was succeeded as Trustee and Manager by his son. Governor Smith was actively associated with the roads now composing the Vermont Central for over 40 years. He had a long and eminent political record also, and was Governor of Vermont in 1863 and 1864. Governor Smith was one of the projectors of the Northern Pacific Railroad, and upon the organization of the company in 1866 he was chosen a director and its President. During the time that he was President—1866 to 1873—the line was built from Lake Superior westward 450 miles.

—Mr. George F. Baker, lately fuel expert for the Southern Pacific Company, is to become editor of the *National Car and Locomotive Builder* next January. Mr. Baker began railroad work about 16 years ago as newsboy on the Chicago & Alton and was afterwards fireman on the Missouri Pacific and other Western roads. For about six years he ran a locomotive on the Wabash, leaving there in December, 1888, to instruct the Chicago, Burlington & Quincy engineers and firemen. For this purpose he traveled over the line using the dynamometer car for a school room, in which he had classes of 16 to 18 men at a time. He wrote the valuable "Manual of Instruction for the Economical Management of Locomotives," which is undoubtedly the highest present authority on the art of firing. Later, he spent about a year in South America as Master Mechanic of the Uruguay State Railways.

It will surprise many of Mr. Baker's friends to learn that he is only 32 years old, but, as he hopefully states it, he "will be 33 next year."

—Mr. Edward Y. Townsend, President of the Cambria Iron Co., died at Bryn Mawr, near Philadelphia, Nov. 5, aged 67 years. He came of a family that has been distinguished in the affairs of Pennsylvania since the days

of William Penn. In the business he first adopted, that of a dry goods merchant, he was very successful. He became a heavy stockholder in the Cambria Iron Co. and was elected Vice-President in 1862, and subsequently President of the company, whose works at Johnstown are now among the greatest in the world. They had twice failed before the firm of Wood, Morrell & Co., of which Mr. Townsend was a member, took charge of them, and it was after Mr. Townsend assumed the Presidency in 1873 that they were put on a sound financial basis, and developed to their present great capacity. The Johnstown flood in 1889 was an especial shock to Mr. Townsend, but he set to work at once to relieve the distress of survivors, and by his liberality and his energy in getting the works started again helped to restore confidence in the future, which was almost as much needed as food or clothing or shelter. Mr. Townsend was a representative citizen all his life, a generous giver to charities and an enterprising business man of the highest integrity.

ELECTIONS AND APPOINTMENTS.

Alabama & Vicksburg.—The stockholders of the company elected the following directors last week: G. T. Boller, W. L. Nugent, Charles Schiff, C. C. Harvey, J. B. Harvey and John F. Winslow; Charles Schiff was chosen President; C. C. Harvey, Vice-President; H. H. Tatem, Secretary and Treasurer.

Atchison, Topeka & Santa Fe.—At the annual meeting of the stockholders, the only change in the board of directors was that George R. Peck, of Topeka, general solicitor, was elected to succeed E. H. Abbot, of Cambridge, Mass. The directors are George C. Magoun, Thomas Baring, William Libbey, J. J. McCook, New York; A. Manvel, Chicago; B. P. Cheney, O. W. Peabody, Warren Sawyer, Alden Spears, Boston; George R. Peck and C. K. Holiday, Topeka; E. B. Purcell, Manhattan, and L. Severy, Emporia, Kan.

Attica & Freedom.—The company was chartered in New York last week, with the following directors: Henry A. Oakley, Richard B. Ferris, Sumner R. Stone, William Jay, August Stein, Charles Wisner, Egerton L. Winthrop, Jr., and Robert W. Candler, all of New York City, and E. P. C. Lewis, of Hoboken, N. J.

Boston & Maine.—The motive power and car departments of the Concord division have been consolidated, and Charles H. Wiggin placed in charge, with the title of Master Mechanic.

Brunswick, Western & Southern.—The officers of the reorganized company are: Dr. Frank B. Ulery, Vice-President; George H. Bliss, Secretary and Treasurer; H. H. Dougherty, General Manager; John D. Bellamy, Jr., Attorney; E. B. Stevens, Southport, N. C., and R. W. Hicks, Wilmington, N. C., Directors.

Canada, La Crosse & Southwestern.—At the annual meeting held at La Crosse, Wis., Nov. 3, the following officers were elected: President, F. A. Rozzine; Vice-President, Alexander McMillan; Secretary, R. Calvert; Treasurer, S. S. Burton.

Chicago & Erie.—At the annual meeting at Huntington, Ind., Nov. 11, the following directors were elected: J. G. McCullough, John King, E. B. Thomas, G. H. Vaillant, Andrew Donaldson, Samuel Spencer, James H. Benedict and Andrew W. Kent, New York; H. H. Brown and John Tod, Cleveland; Jay C. Morse and Volney T. Malott, Chicago, and M. D. Woodford, Cincinnati. The officers are re-elected: J. G. McCullough, President; E. B. Thomas, First Vice-President; G. H. Vaillant, Second Vice-President; Edward White, Treasurer; Arthur Turnbull, Secretary.

Colorado Midland.—At the annual meeting held at Colorado Springs last week the following Board of Directors was elected: Thomas Baring, Cecil Baring, J. R. Bush, William Libbey and G. C. Magoun; J. J. McCook, New York; B. P. Cheney and J. W. Rinehart, Boston; A. Manvel, Chicago; J. B. Wheeler, Aspen, and J. J. Hagerman, Colorado Springs.

Denver & Rio Grande.—The board of directors recently elected organized last week by choosing George Coppel as chairman of the board, Edward T. Jeffery as President and General Manager, J. W. Gilluly as Treasurer and W. Wagner as Secretary and Assistant Treasurer.

Green Bay, Winona & St. Paul.—F. B. Seymour has been appointed General Superintendent. J. B. Last has been promoted to the position of General Freight and Passenger Agent. Both officers will have headquarters at Green Bay, Wis.

Gulf, Colorado & Santa Fe.—C. W. Crabb, Train Dispatcher on the main stem of the Louisville & Nashville, has been offered the position of Chief Train Dispatcher of this road, with headquarters at Galveston, Tex.

James McDonough, traveling engineer, has been promoted to Assistant Master Mechanic, with headquarters in Texas. James Brady, former Division Master Mechanic at Galveston, has been promoted to Temple. John Kelly has also been transferred from Temple to Galveston.

Manhattan (Elevated).—The following were elected at the annual meeting of the company, held at 73 Broadway, New York City, Nov. 11. Directors: Jay Gould, R. M. Gallaway, Russell Sage, Samuel Sloan, Sidney Dillon, George J. Gould, J. Pierpont Morgan, Frank K. Hain, Cyrus W. Field, Edwin Gould, Chester W. Chapin, Simon Wormser, and T. C. Eastman. The only changes in the Board was the election of Frank K. Hain and T. C. Eastman to succeed John H. Hall and S. V. White. Executive Committee: R. M. Gallaway, Russell Sage, Samuel Sloan, Sidney Dillon, George J. Gould, J. Pierpont Morgan, and Edwin Gould. Officers: President, Jay Gould; First Vice-President, George J. Gould; Second Vice-President, Frank K. Hain; Secretary and Treasurer, Daniel W. McWilliams.

Meriden, Waterbury & Connecticut River.—The annual meeting was held at Meriden, Conn., Nov. 10. The following were elected directors: George H. Wilcox, George R. Curtis, Samuel Dodd, A. Chamberlain and George Rockwell, Meriden; A. S. Chase, E. D. Steel, H. F. Wade and J. R. Smith, Waterbury. The directors elected George H. Wilcox, President; E. D. Steele, Vice-President; George Rockwell, Secretary and Treasurer.

Minneapolis & St. Louis.—John Tonge has been appointed Master Mechanic to succeed W. H. Whitaker, resigned.

Missouri, Kansas & Texas.—The formal and legal organization of the Texas lines, which have been recently consolidated under a special charter from the

State, was effected on Nov. 10, at Denison, Tex., the State headquarters. The officers elected were: Chairman, Henry C. Rouse, New York; President, H. C. Cross, Emporia, Kan.; Vice President, J. Waldo, Houston; Second Vice-President, R. C. Foster, Denison; Treasurer, W. B. Munson, Denison; Secretary, F. P. Merrill, Parsons, Kan.

New Orleans & Northeastern.—The stockholders' meeting was held in New Orleans, Nov. 5, when the following directors were elected: Henry Abraham, Jules Aldige, Frank S. Bond, D. Graff, Harry H. Hall, C. C. Harvey, J. P. Richardson, Charles Schiff and R. M. Walmsley. Directors elected: Charles Schiff, President; C. C. Harvey, Vice-President; John Glynn, Jr., Secretary; H. H. Tatem, Treasurer.

Northern Pacific.—John Dorsey has been appointed Assistant Superintendent of the Rocky Mountain division, with headquarters at Wallace, Idaho.

Old Colony.—C. A. McAlpine, Station Agent on the road at Mansfield, has just been appointed Superintendent of the Northern division, with headquarters at Framingham, Mass.

Pan American (Texas).—The directors have elected the following officers: J. S. Anthony, Boston, President; George H. Towle, Boston, General Manager; William Davis, San Antonio, Tex., Superintendent; R. W. Stayton, Corpus Christi, Tex., Treasurer; George Vineyard, Corpus Christi, Secretary.

Pittsburgh & Moon Run.—The officers of this road, just opened for traffic are: President, J. Casement, of Painesville, O.; Treasurer, Peter M. Hitchcock, Cleveland; R. L. Casement, Secretary, and General Manager, N. F. Sanford, of Mansfield, O.

Portland & Fairview.—The company has filed supplementary articles of incorporation in Oregon, with J. D. Hart, J. Rosenthal, W. J. Burdew, F. Fields, Alfred Rosch, D. Dalzeish and Frank Gilham named as the Directors. The office is at Portland, Ore.

Sugar Run.—The following directors have filed a charter for this company in Pennsylvania: W. S. Lewis, L. E. Larrabee, M. S. Gridley, W. N. Rouseville, John H. Stone, Couersport, Pa.; D. H. Jack, Bradford, Pa.; A. A. Healey, New York City, and George E. Brown, Wellsville, N. Y.

Western Maryland.—At a meeting of the directors of the company in Baltimore last week J. M. Hood was re-elected, for the nineteenth consecutive year, President and General Manager.

Wisconsin Central.—At the annual meeting of the stockholders directors were elected as follows: Edwin H. Abbot, Cambridge, Mass.; Frederick Abbot and Howard Morris, Milwaukee; S. R. Ainslie, Chicago; Henry F. Spencer, Eustace C. Fitz, John F. Anderson, and Jeremiah Smith, Boston; Rowland G. Hazard, Peacedale, R. I.; William L. Bull, New York; George W. Johnson, Brookfield, Mass. The following officers were elected: Edwin H. Abbot, President and Treasurer; Frederick Abbot, Vice-President and Assistant Treasurer at Milwaukee; Howard Morris, Assistant Secretary and General Solicitor; Henry F. Spencer, Assistant Secretary and Assistant Treasurer at Boston.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Austin & Northwestern.—The officers have met with a good deal of unexpected difficulty in securing the right of way for the Llano extension, which has delayed the commencement of grading. The contract for building the extension to the iron mines is understood to have been let, and a small force began grading near Marble Falls, Tex., last week.

Bangor & Aroostock.—The directors and stockholders of the company held meetings in Bangor last week. Reports from the surveying parties showed that the entire survey will be completed in January. The first party has finished the survey of the line to Island Falls. The third party has been with the first on taking the preliminary and the other the permanent location, and the work to Island Falls has been completed. The second party has finished the location of the road to Presque Isle, and is now working beyond that town. A good route is being found along the entire region which has been surveyed.

Beech Creek.—The contractors on the western extension of the line are working rapidly to complete the branch before winter if possible. They have about 1,000 men working along the river to Cherry Tree, in the northern part of Indiana County, Pa.

Belleville & St. Louis.—The capital stock of the company has been recently increased from \$50,000 to \$100,000 and a mortgage for \$400,000 has been authorized on the 13 miles of road between Belleville and East St. Louis, which are now under construction.

Brunswick, Western & Southern.—At a recent meeting at Wilmington, N. C., the directors decided to order the survey for the road to be made at once between Wilmington and Southport, N. C.

Buffalo & Geneva.—Chief Engineer King states that much work has been done during the recent long continued fair weather, and he thinks that by Dec. 1 the single track line will be finished from Buffalo to the Genesee River, leaving a distance of about three-fourths of a mile unfinished. This last piece of track consists of a large fill, which will take nearly the whole of December to complete. As soon as the single track is joined work will be pushed on the second track. About 10 miles of this is now finished.

Buffalo, Rochester & Pittsburgh.—A new survey for the projected extension from Howard Junction south to Clarion Junction, Pa., was commenced last week by J. M. Floesh, who made a survey for the line over a year ago. The company now has running rights over the Kinzua Viaduct and the line of the New York Lake Erie & Western between the two points, but the traffic is said to be so heavy that there is much inconvenience in the operation of the line by the two companies. Whether this new work will result in the building of the new line it is too early to say. Some construction work has been accomplished between these points by an independent company projected by Mr. Adrian Iselin, Jr. This line will probably be leased if the project is carried out.

Burlington & Missouri River.—An extension west of Culbertson, Neb., under the charter name of the Republican Valley & Wyoming, was begun last week. The new line is to extend from Culbertson, on the Denver line, north of the Republi-

can River, northwest through southwestern Nebraska to Holyoke, Col., near the state line on the extension to Cheyenne. The new line is 32 miles long and was located several months ago.

Calgary & Edmonton.—There are still two grading outfits at work beyond Mosquito Creek, on the line south of Calgary, and the grading will be carried this fall within eight miles of MacLeod. Work is still in progress on the bridges over Fish Creek, Sheep Creek and High River, and will be finished in November. Rails will be laid to Mosquito Creek at least this fall. There is nothing absolutely settled in regard to the line going into MacLeod. The line may stop at the north bank of the Old Man's River, but it is said the government is urging the company to continue it into the town of MacLeod.

Canadian Pacific.—Recent interviews with President Van Horne in which it was stated that the construction of the line from Woodstock, Ont., to the Niagara River was under consideration and that active work on the construction would begin at an early date, were unauthorized. An officer writes that nothing has yet been decided about the construction of this line. It has not yet been located and from present appearances it is not likely to be built either this year or next.

The grading on the southwestern branch between Deloraine and Napinka, Man., has been suspended for the present, and Contractor Dennison has removed his outfit to the Souris branch, the company being anxious to have the grading on the latter completed before winter sets in.

Chesapeake & Ohio.—Boxley, Dickinson & Haley are reported to have the contract to build a second track from Alderson, W. Va., to Lowell, a distance of about 10 miles. The company also proposes to soon build a second track between Low Moor, Va., and Covington, Va., 11 miles.

Chicago Central.—It is announced that this road will soon be in operation. It has been built from Blue Island north to Seventy-fifth street, Chicago, a distance of seven miles. It runs parallel to Western avenue and about 600 ft. west of it. It curves in a northeasterly direction from Seventy-ninth street to its intersection with the Belt line just west of the Panhandle road, where it turns and runs directly north and parallel to the Panhandle until it reaches the Santa Fe and Grand Trunk Railroads at Forty-ninth street. From Seventy-ninth street to Brighton the grading has been nearly completed and the laying of the track on this portion of the road and the crossing of Fifty-fifth street Boulevard will complete the entire road from Blue Island into the city of Chicago.

Chicago, Indianapolis & Chattanooga Southern.—A locating survey for the line between Mitchell, Ind., and Rockport, Ind., on the Ohio River, has been recently completed. The surveys were continued through Ferdinand to French Lick Springs. The contracts for grading part of the line north of the Ohio River will be let, the officers report, next February. During the winter an effort will be made to obtain subscriptions to the capital stock in various of the townships and counties. The line is to be continued through Kentucky, from Owensboro. F. L. Patrick, of Columbus, O.; B. R. Cowan, of Cincinnati, O., and D. O. Erwin, of Indianapolis, Ind., are directors.

Chicago & Northwestern.—About 40 teams and the same number of men have been employed on the double tracking of the Milwaukee division for the last month. The work now being done is between Waukegan and Spring Bluff, Ill., a distance of nine miles. The work is under contract to Kimball & McNamara, of Sioux City, Ia.

Chicago & West Michigan.—The track on the extension north of Traverse City was completed to Elk Rapids, Mich., a distance of 18 miles, early last week. This includes about nine miles of a branch line from Williamsburg to Elk Rapids. North of the former town the line has been graded for the greater part of the distance to Charlevoix and Petoskey and the rails are now being laid.

Colorado Eastern.—The condemnation suit of this road against the Union Pacific to obtain a right of way from the terminus of the line to Twenty-third street, in Denver, Col., has been settled in the United States courts by the payment of \$70,000 by the company to the Union Pacific. The court awarded the right of way to the Eastern company some time ago and the Union Pacific accept the award.

Colorado Southern.—The company filed articles of incorporation in Colorado last week. The proposed route is from Texas Creek, near the Denver & Rio Grande line, southeasterly to Westcliffe, a mining town. The projectors have not got so far as to have outlined a definite line, but will wait until surveys have been perfected. The capital stock of the company is \$500,000. The directors are H. H. Tomkins, E. C. Humphreys, of Westcliffe, Col.; B. R. Tilden, Edgar P. Hershey, and J. R. Smith, of Denver.

Dakota, Wyoming & Eastern.—Grading is still going on rapidly on the 30 miles east of Rapid City, S. D., which were put under contract last July, but the contractors are now reducing their force, and propose to suspend the grading in a few weeks. It is proposed to resume work, however, as early in the spring as the weather will permit, and the officers expect to complete the road to the Missouri River early next year.

Ducktown Mineral.—The preliminary surveys south of Ducktown, Tenn., and the Hiwassee River have been about completed through Eastern Tennessee to a point near the North Georgia State Line. The estimates and profiles are now being made by F. O. Sinclair, Chief Engineer, of Chattanooga.

Duluth & Winnipeg.—This company has arranged for entrance to the Union Station at Duluth. The track is completed beyond Cloquet, Minn., to within 10 miles of that city, and for the present the tracks of the St. Paul & Duluth will be used from that point into the station in Duluth.

Florida Central & Peninsula.—A survey has been recently made for a branch into the phosphate region, south of Sydney, Fla., on the main line. It is proposed to begin the construction of a line at once, and to have it completed in December.

Georgia, Carolina & Northern.—Maj. Winder, the General Manager, said last week, speaking of the progress on this line, that the track had been laid to a point near Jug Tavern, about 30 miles northeast from Atlanta, and trains are now running regularly to Athens. There are now 235 miles of the road completed, from Monroe, N. C. The line is in operation to Athens, 200 miles to Jug

Tavern, and when the road is completed it will be 267 miles in length.

Grand Trunk.—The contractors on the second track are putting forth every effort to complete their work before heavy frost sets in. The small engines have been discarded, and heavy freight engines are now used to haul the ballast from the pits along the line. Men are engaged laying the rails west of Gage's Creek to Port Hope, Ont. After that is completed the connection will be made between that town and Grafton. It is expected that the new track will be ready for use east of Port Hope to Colbourne, 20 miles, the present month. This work is on the contract of Sinclair & Doherty, of Toronto, who early in the spring began the grading and other work for a double track on the section between Port Hope and Trenton, near Belleville, Ont., 38 miles. The second track on the section west of Brockville, Ont., beginning at Gananoque and ending at Napanee, near Belleville, is about completed.

Great Northern.—President J. J. Hill has submitted a proposition to the city of Minneapolis to lower the tracks of the Great Northern in East Minneapolis. It is estimated that the cost of this work, from Main street to Central avenue, including six highway bridges, would be \$300,000. Mr. Hill offers to pay two-thirds of this if the city of Minneapolis will pay the remaining \$100,000. It was stated that the total cost of the improvements, including new bridges across the Mississippi River, will exceed \$1,000,000. The City Council has the matter under advisement, and will doubtless accept the proposition if the necessary funds are found to be available.

Great Northwest Central.—The ballasting is being pushed rapidly forward, the road being ready for traffic to Chumash, in Marquette County, Man., the end of the line; near Oak River a strong force is at work connecting the line with the Canadian Pacific, at Chater, in Selkirk County, where a roundhouse and other buildings will be erected. It is expected that the transportation of wheat will begin in about two weeks.

Houston, Central Arkansas & Northern.—The trains are now running for some miles south of Columbia, La., and across the new Ouachita River, and the track south of that point is being laid at the rate of two miles a day. The bridge over the Red River at Alexandria is being rapidly completed, the low water in the Red River permitting better progress on the work than was anticipated. All of the piers have been finished except the coping on five of them. Part of the iron work for the superstructure has been delivered and a large number of men will soon be engaged on this part of the work.

Jacksonville, St. Augustine & Halifax River.—The branch of this road into the town of San Mateo, Fla., has been entirely graded, and the bridge work completed on about half the line. The track laying will probably be commenced next week. The branch is about three miles long, and is a relocation of the old line which ran to the west of the town.

Los Angeles Terminal.—The line between Los Angeles and Long Beach, Cal., was formally opened for regular traffic the entire distance on Nov. 7.

Maine Shore Line.—The surveying parties that have been engaged in locating the Shore Line have completed their work for this season. The western division between Sullivan and Columbia Falls, Me., have made a full survey and were disbanded at Dennysville. The engineers on the branch line between Calais and Eastport, and Calais through Pembroke, Dennysville and the other towns lying between the former place and Machias, on the main line, completed their work Monday. A small part of the eastern route has received only a preliminary survey, which a few days' work in the spring will complete.

Manitoba & Northwestern.—It has been decided to push the construction work on this road to Prince Albert, in Saskatchewan, as soon as financial arrangements can be concluded. The distance between Prince Albert and Winnipeg will be shortened 100 miles over the line via Regina. An effort will be made in England during the coming winter to arrange the financial matters, and it is hoped that the work of construction will be under way not later than June next. Surveyors have just completed an examination of the route to Prince Albert.

Marquette & Western.—Articles of incorporation have been filed with the Secretary of State at Madison, Wis. It organizes with a capital stock of \$2,000,000, and is to build a road west from Marquette, via Antigo and Merrill, to Abbottsford. Among the directors are Isaac Stephenson, James Spalding, E. S. Schofield, Frederick Carney, J. A. Van Cleave and H. C. Higgins.

Montana Central.—The contract for lining the Wickes tunnel has been let to Messrs. Henry Downs & Son, of Minneapolis, Minn. The bore of the tunnel will be faced with granite 20 in. thick, which will be backed with a brick arch. The entire tunnel, including 700 ft. of approaches, will be lined. The total length is nearly 7,000 ft. It is estimated that it will require two years to complete this work, which will be prosecuted continuously, an electric lighting plant being already in place. The work will cost nearly a million dollars, and the nature of this work is an indication of the future policy of the road.

The 12-mile extension of the line from Monarch to Neihart, Mont., was opened for travel last week. It is a continuation of the branch south from Great Falls to Monarch, which was completed recently. The branch runs through a rich mining country.

Mount Carmel & Natalie.—This road, which connects the Philadelphia & Reading line with the Pennsylvania Anthracite Coal Company's property, at Mount Carmel, is completed, and was opened for the shipment of coal Nov. 10. The Pennsylvania Anthracite Company owns 2,754 acres in Columbia and Northumberland counties, Penn., of which 2,200 acres are good coal lands. It is the company's intention to erect a second breaker next year and increase its output to 1,000,000 tons of coal a year. The road just opened is six miles long, extending from Natalie to Mount Carmel, and was built by J. C. Stanton & Co., of New York.

New Roads.—W. O. Titus, of Eagle Pass, Tex., began a survey last week from the Fuente coal mines in Mexico, south of Eagle Pass, to a connection with the Mexican International, a distance of three miles. It is proposed to complete this section at once, and the surveys are to be continued southwest to Lampazos, on the Mexican National.

The people of Abbeville, La., have agreed to vote a township tax of five mills for ten years and give the right of way from Abbeville to Lake Arthur to J. B. Watkins, of Lake Charles, La., for the construction of a road from that point to Abbeville.

New York, New Haven & Hartford.—A large amount of work on the quadruple and double tracks of the New York and Shore Line divisions has been accomplished. Between Bridgeport and South Norwalk, Conn., the four tracks will probably be in use for 14½ miles in two weeks. Nine miles of four-track road is in operation between New Rochelle and Port Chester, and with the section between South Norwalk and Bridgeport now nearly ready for operation about two-fifths of the distance between New Rochelle and New Haven will be operated as a four-track road. The plans for the new route through the town of Bridgeport, which propose the construction of about a mile of elevated road, are still the subject of discussion.

Northern Pacific.—Chairman Henry Villard is now traveling in the west and was at Tacoma last week. Asked about contemplated improvements of the road at Tacoma, especially the new passenger station at Seventeenth street and Pacific avenue, he said the question was not decided. At present the new hotel, 50 per cent. of the stock of which belongs to the railroad company, is taking and will take a large amount of money. It is not the intention, as stated some time ago by a director, to build any more branch lines in Washington very soon. The branches under way will be completed and perhaps an extension built from Sedro into Whatcom through Fairhaven. The company, he said, did not contemplate any further expenditures on the Tacoma water front until the litigation over the title was definitely settled between the company and the state through the harbor line commissioners.

Ottawa & Parry Sound.—Surveyors have commenced work on this road near Barry's Bay, in Renfrew County, Ont., where the previous survey terminated, and will survey the remainder between that point and the Northern Railroad.

Pan American (Texas).—The contract was let last week for the grading of the first 50 miles from Victoria toward Brownsville. J. H. Barrett, the contractor, is already forwarding his grading outfit from Waco to Victoria. He says work will commence within two weeks. The company will build from Victoria to Brownsville, and the road will extend through the counties of Victoria, Refugio, San Patricio, Nueces and Cameron. Surveyors have already been put in the field, and the work, commencing at Victoria, is to be pushed as rapidly as possible.

Pawnee.—The contract for the extension west of the connection with the Jacksonville Southeastern near Glenarm to Auburn, Ill., has been let to C. A. King, of King, Ill. The grading has been commenced with a force of about 50 men, and it is expected to complete two miles of the line before winter. A trestle 800 ft. long is the only bridge work of any importance on the extension. The grading is very light. When completed to Auburn the road will be 10 miles long.

Pennsylvania.—A corps of Pennsylvania engineers began this week, surveys for a second track on the Mt. Joy branch, near Lancaster, Pa., increased facilities for the running of the fast trains being found necessary.

Penobscot Central.—It is expected that the \$50,000 being raised in Bangor, Me., for this road, will soon be secured, and as the contract for building the line is already let, work will begin, it is promised, as soon as the subscription is completed. T. P. Batchelder, of Kenduskeag, Me., the Secretary and Treasurer, says \$41,000 has been raised, and \$41,000 of the amount is on deposit in Bangor. About \$3,000 has been used in making the preliminary survey. This road is to extend from Bangor through Kenduskeag, Corinth and Charleston to Milo Junction, about 85 miles. The contract for the grading has been let to D. R. Brewer, of New York.

Philadelphia Belt Line.—The company has filed with the city authorities of Philadelphia a bond for \$250,000, as provided by the bill giving it a franchise to construct a belt line along the water front of Philadelphia on Delaware River, from Reed street to Lehigh avenue. The company will apply this week, before the Board of Supervisors, for permission to begin work from a connection with the Philadelphia & Reading tracks at Callowhill street, southward to Queen street. This section, it is estimated, will cost \$41,000 to build. Work upon the line north of Alleghany avenue has been proceeding quietly for some time, and already three-fourths of a mile has been graded. The right of way has been secured for 5,000 ft. more, and negotiations are progressing for two more miles of right of way along the river toward Tacony. The company has transferred to the Board of Trade and Commercial Exchange, of Philadelphia, shares representing 51 per cent. of the capital stock, having voting power, to secure the control of the line continuing with interests in sympathy with the manufacturing interests of the city.

Philadelphia & Reading.—It is understood that the company will only undertake the construction of the Frankford branch, a suburban line to the northeast of Philadelphia recently surveyed, if the amount necessary to build the line is subscribed at Frankford.

Pittsburgh & Lake Erie.—This week an additional mile of second track, the section between West Economy and Redstone, was opened for traffic. This completes 25 miles of double track out of Pittsburgh, the two tracks extending to Stobo. On the Youngstown end of the line, the second track between Carbon and Edensburg having been completed, there are now 14 miles of double track at that end. These two sections and the 15 miles between Beaver and Wampum give 54 miles of second track out of the 68 miles between Pittsburgh and Youngstown.

Pittsburgh & Moon Run.—This road was completed last August, but it was not opened for the transportation of coal, which will be its principal item of traffic, until Nov. 5. The line extends from Groveton, Pa., on the Pittsburgh & Lake Erie, 11 miles from Pittsburgh, up Moon Run for six miles. It opens a valuable coal district, in which four mines have been started in anticipation of the completion of the road. The promoters of the road were Gen. J. Casement, of Painesville, and Peter M. Hitchcock, of Cleveland. The company, as yet, does not own any cars, but it soon will purchase some. Arrangements have been made with the Pittsburgh & Lake Erie, by which freight traffic can be carried.

Pittsburgh & Western.—With the completion of the work near Sharpsburg, Pa., which will be within a few days, the road will have a double track between Allegheny and tunnel No. 1, six miles from the city. Much part of the work consisted in the laying of about two miles of new track. Between Allegheny and New Castle the road now has about 15 miles of double track.

Port Angeles Southern.—Contracts have not yet been awarded for the construction of the road, as has been reported, and will not be let this year. Surveys are

about half complete from Port Angeles, via Reno and Seguin Bay to Junction City, near Port Townsend, Wash., about 35 miles, and part of the right of way has been secured.

Richmond & Danville.—The extension of the North Carolina Midland, recently completed between Winston and Mocksville, N. C., a distance of about 26 miles, is now in operation. It is proposed to extend the line still further southward to Mooresville, connecting with the Atlantic, Tennessee & Ohio road, south of Statesville. This extension will be about 28 miles long, and has already been located. The arrangements for constructing the line have not been fully completed, and it is not likely to be built in the near future, but will probably be placed under construction in the spring of next year.

Rio Grande Southern.—While the contractors were hurrying to completion the section on the northern division to Rico, Col., work was not suspended on the southern section north of Durango, the terminus of the road. The work on the southern end is now completed to Mancos and over 200 men are laying the rails, about two miles being now laid daily. President Mears gives the following report of the work now going on at that end of the line: The southern end is now completed for a distance of 40 miles and there remains but 56 miles to finish before the line will be open all the way through. The grading is nearly done, at least what remains to be done will not interfere with the completion of the road, as there is no heavy work in the way of blasting to delay us. In about ten days we will begin to lay rails south from Rico, and if the weather remains favorable the two gangs will meet early in December and trains will commence running through to Durango within a few days after. No ordinary bad weather can interfere with the work. We can go right ahead, even if as much as two feet of snow falls, and we are not likely to have any worse weather than that before Dec. 1. We have just begun to run trains between Mancos and Durango, both freight and passenger. The Mancos valley is thickly settled and the products of the valley are grain, hay and lumber, and recently anthracite coal has been discovered.

St. Louis Unicycle Railway Co.—Surveys are being made by Johnson & Flad, of St. Louis, over what is known as the Scott franchise for an elevated to be built by this company within the city limits. The road proposed is to be constructed under patents controlled by this company, and as soon as the new surveys are finished the company expects to proceed immediately with the construction, about three miles of the line. The company has applied to the city authorities for authority to build an experimental track, and as soon as this is received the contract for building the line will probably be let. Estimates for the superstructure work have been made by Johnson & Flad and bids for the steel and iron work have already been made by several firms. The company proposes to erect a track on Thurman boulevard, from Tower Grove Park to Park avenue, westward on Park avenue to the corner of Forest Park, thence along the south side of Forest Park to Skinker road and to Benton Station. Hamilton Daughaday is President, and L. A. Brown is General Manager.

St. Louis, Vandalia & Terre Haute.—The company is cutting down grades east of Terre Haute, Ind., and when the work laid out for this season is completed, freight engines are expected to haul seven more cars than the present maximum load. The time of passenger trains can also be made faster by several minutes.

San Antonio & Aransas Pass.—The surveying party, in charge of Engineer J. A. Hinman, surveying a new route from the West Point division, reached the Gulf of Mexico last week. The survey was made from Evergreen, in Lee County, southeast through Fayetteville, Columbus, and Altair, where the Colorado River was crossed; to Marshall and over the old grade of the Galveston & Eagle Pass road to Columbia; along the Brazos River through Brazoria to Velasco, across the Brazos River, and along the coast to the western end of Galveston Island. It connects with the Galveston & Western, a short line extending westward from the city. The distance is 200 miles.

Scottsboro & Guntersville.—The Southern Industries Co., of Boston, Mass., which is building the new industrial town of Columbus City, Ala., has secured the charter of this road, and proposes to resume the construction between Scottsboro and Guntersville and have the line completed by Jan. 1, 1893. The road is to be built from Scottsboro via Columbus City to Guntersville.

South Bound.—The South Carolina Railroad Commission Saturday last inspected the railroad between Savannah and Columbia, S. C., and the road was opened to traffic on Monday of this week. It is 140 miles long, built through a rich farming country, and forms, by connections with the Richmond & Danville Railroad at Columbia, a short line from the north, competing with the Atlantic Coast Line system.

Southern Pacific.—The company has a number of men at work near Smithfield, Or., a few miles north of Dallas, to change the gauge on the southern end of the West side division of the Oregon & California. The bridges on the 16 miles of this division below Dallas are to be renewed and the cuts and fills widened for a standard gauge track. The change from the narrow gauge, however, will hardly be completed before next summer.

A. A. Grant & Co., of San Francisco, have the contract for rebuilding the 30 miles of the main line on the north side of the Colorado River, between Yuma and Adonde, Ariz. The new line is being built on a plateau on higher ground than that on which the present line is located, and will, it is expected, be out of danger from the disastrous washouts to which the present line is occasionally subjected, especially in the spring. The new road is to be completed next January. The surveys were made by Chief Engineer Hood over a year ago, at the time of the last washouts.

Bright & Crandall have secured the contract for grading a branch from a point on its main line near Mound City to Redlands, Cal. Work began this week, and the line will probably be completed in 30 days.

Sugar Run.—The charter of this company was filed at Harrisburg, Pa., last week. The company proposes to build a line from Sugar Run Junction, McKean County, to Sugar Run Station, McKean County, 12 miles. The capital is \$120,000.

Tacoma & Eastern.—Engineer V. G. Bogue has returned from his examination of this new road, and is expected to make a favorable report. He was engaged to report upon the feasibility of extending the road from Tacoma further south, reaching the coal fields lying in that direction.

Vancouver, Klickitat & Yakima.—A statement is printed in the local paper at Vancouver, Wash., that a report had been received in Vancouver last week from reliable authority in New York that the project of extending the road east of its present terminus, 10 or 15 miles from Vancouver, was an assured fact. Work on this line may be expected to be resumed at no distant day.

Velasco Terminal.—The grading of the road from Velasco northwest to Chenango, Tex., is completed, and the ties are being distributed ready for the rails. As soon as the rails arrive the tracklaying will begin and will be pushed vigorously forward. It is expected the trains will be running through to Velasco at the mouth of the Brazos River by Dec. 1.

Wabash.—Work was commenced Monday of last week in two places on the new line between Montpelier and Chicago (the Detroit Short Line), and this week at other points where the work to be done is heavy, men and teams will be set at work. At South Milford in La Grange County, Ind., 60 men and a large number of teams are now employed.

West Virginia, Central & Pittsburgh.—Tracklaying on the Beverly extension was completed last week. The entire force of graders was transferred to the Pittsburgh extension, which will now be pushed to completion. The Grafton & Greenbrier road is distributing cross-ties along the line of its road, so as to make it a standard gauge, as the West Virginia Central is ready to make connections.

West Virginia & Pittsburgh.—Tracklaying on the new road to the Gauley River from near Shaversville, W. Va., above Sutton, will commence this week. The track will only be laid as far as the mouth of Laurel Creek this fall. This is done so that supplies for the contractors can be taken to that point by rail, thus saving a long distance to haul in wagons.

Wheeling & Connellsville.—Frank J. Hearne, Manager of the Riverside Iron Works at Wheeling, is the President of this proposed road, and said last week concerning the project: "The line will assuredly be built, though work will have to be delayed until the coming spring. The organization is fully complete. The road will be 73 miles long, extending east of Wheeling to Connellsville, Pa. It will be mainly a freight road, reaching the coal fields at Connellsville. We think we can save iron men at least 70 cents a ton on Connellsville coke haulage." B. F. Johnson & Co., of St. Elmo, Ill., are reported to have the contract for the grading now being done and M. S. Cartter & Co., of St. Louis, the bridge work.

GENERAL RAILROAD NEWS.

Attica & Freedom.—The railroad company was incorporated in New York Nov. 5, with a capital of \$108,000. The corporation is formed to operate the Toaawanda Valley & Cuba narrow-gauge road already built, about 36 miles in length, running from Attica, Wyoming County, to the town of Freedom, Cattaraugus County, with a branch from Java, Wyoming County, to Java Lake.

Baltimore & Ohio.—The Directors this week declared a stock dividend of 20 per cent. on the common stock, and authorized an issue of \$5,000,000 new common stock for improvements and extensions. In explaining the issue of the stock dividends, the Directors say that for the last three fiscal years the net earnings and income of the company have amounted to \$4,545,272.34; after charging to "profit and loss" of those years the sum of \$1,617,051 there still remained the sum of \$3,311,455, which had been used in reduction of the bonded and car trust indebtedness to the amount of \$1,325,102, and also for permanent improvements. That it is not deemed desirable to continue longer the appropriation of the net earnings and income of the company to expenditures for betterments, but to provide for them out of sales of common stock. By the additional issue, the total capital stock of the company is increased to \$25,000,000. The new stock not to be used for dividends will be taken by a syndicate.

Brooklyn Elevated.—At a meeting of the stockholders it was voted to abandon that portion of the road situated on Park Avenue between Hudson and Grand avenues, and on Grand Avenue between Park and Myrtle avenues. This action was taken under that provision of the law which permits railroads that complete six-tenths of a chartered line to abandon a portion thereof. The resolution must now be referred to the State Commissioners for their approval. The iron material of the abandoned sections will probably be used in extending the East New York line.

Calgary & Edmonton.—At the adjourned annual meeting of the Canadian Pacific in Montreal Nov. 10 to consider the acquisition of the Calgary & Edmonton Railroad, it was found that the unanimous assent of the bondholders of the latter company had not been assured, and further consideration of the matter was postponed until Dec. 14.

Canadian Pacific.—The gross earnings of the company for September, 1891, were \$1,835,658; operating expenses, \$1,010,417; net profits, \$825,240. In September, 1890, the net profits were \$712,051; a gain for September this year of \$113,188. From January to Sept. 30, 1891, the net profits were \$5,162,708, against \$4,253,363; a gain of \$909,422.

Central of Georgia.—The floating debt of the road has been provided for by two loans, dating from Nov. 1 and running for one year. One loan with Speyer & Co. is for \$3,700,000 at six per cent. and two and one-half per cent. commission. The collateral is consolidated five per cent. bonds of the company at 50 cents on the dollar. The other loan is with the Mutual Life Insurance Co. for \$700,000 at six per cent. without commission. Against this Savannah & Western Railroad bonds are pledged. Both loans can be renewed for four months. The proceeds of the two operations will exceed the floating debt by \$250,000.

Central of New Jersey.—The company has filed with the Interstate Commerce Commission the following report for the fiscal year ending June 30:

	1891.	1890.	Inc. or dec.
Gross earnings.....	\$14,584,758	\$13,950,094	I. \$634,664
Operating expenses.....	7,872,475	7,982,751	I. 189,274
Net earnings.....	\$6,712,283	\$5,967,343	I. \$744,940
Other income.....	603,906	999,078	D. 395,172
Total income.....	\$7,316,189	\$6,966,421	I. \$349,768
Interest, rentals, taxes...	5,159,009	5,054,585	I. 104,424
Surplus.....	\$2,157,180	\$1,911,836	I. \$245,344
Dividend.....	1,229,886	1,116,487	I. 113,399
Surplus.....	\$1,227,294	\$1,097,349	I. \$129,945

Evansville & Terre Haute.—The annual report for the year ending June 30 last shows: Gross earnings, \$1,146,685, compared with \$1,022,407 last year; operating expenses, \$575,033, against \$467,071 in 1890; net earnings, \$571,591, against \$555,335; fixed charges, taxes, etc., \$254,025, compared with \$234,323; net income \$317,566, compared with \$321,012, and surplus, after paying dividends, of \$152,506, compared with \$171,012 last year. The freight traffic yielded .9 cent. per ton per mile, compared with 1 cent last year, and passenger traffic 2.6 cents, against 2.7 last year.

Houston & Texas Central.—An action to recover \$445,000 and interest has been instituted in the United States Court at Galveston by the Lackawanna Iron & Coal Co. against the road. It is really an intervening petition to the foreclosure suit of the Farmers' Loan & Trust Co. against the railroad company. The money is due, it is claimed, for rails delivered to the railroad. The manufacturers accepted promissory notes, payable in six months, and they have 25 of these notes. The petition asks that this claim be made a prior lien on the net earnings, and in case the earnings are not sufficient, that the claim be allowed out of the proceeds of the sale of the road. Judge Pardee allowed the petition to be filed.

Illinois Central.—The following is a statement of the operations of the road for the three months to Sept. 30:

	1891.	1890.	Increase.
Mileage.....	2,884	2,875	9
Gross earn.....	\$4,741,863	\$4,257,341	\$484,522
Oper. expen.....	3,461,254	3,075,767	385,487
Net earn.....	\$1,280,609	\$1,181,574	\$99,035

Kansas, Colorado & Pacific.—A special meeting of the stockholders of the company will be held in Fort Scott, Kan., Nov. 5 to vote upon a proposed increase of the capital stock, to provide for the purchase of railroads and other property.

Lake Erie & Western.—Calvin S. Brice, president of the railroad, has issued a circular in reply to recent criticisms of the new issue of second mortgage bonds. It gives elaborate details respecting the company's condition, and denies the charge that secrecy attended the meeting of stockholders which authorized the issue. The company has sold \$1,500,000 bonds to an old and conservative banking house, and the company is pledged to make no further issue before June, 1893. The proceeds of the bonds will be expended for the following purchases and improvements: Twelve Mogul locomotives, \$100,000; 20 passenger cars, \$100,000; freight cars, including 1,000 cars under contract and in course of delivery, \$550,000; rails, \$50,000; additional terminals at Sandusky, Indianapolis and Peoria, additional yards, sidings, telegraph lines, round houses, coaling stations, etc., \$200,000; ballasting, iron bridges and betterments of roadbed, \$200,000, a total of \$1,500,000. The general manager declares that the increase in net earnings probable from these increased facilities will be more than double the amount of the increase in fixed charges caused by the issue of new bonds.

Louisville, New Albany & Chicago.—At the special meeting of the stockholders of the road held at Indianapolis, Nov. 9, the directors were authorized to issue \$5,000,000 additional common stock, the money thus raised to be used in bettering the road and to carry out the plans previously described.

New York & Boston Rapid Transit Co.—At a recent meeting of the stockholders of the company held in Jersey City, the directors were authorized to issue \$500,000 of six per cent. five-year bonds, which were offered to stockholders for subscription on Nov. 5 at 90. The mortgage is to be delivered as soon as \$100,000 of the bonds have been subscribed. The proceeds of the bonds are to pay in full the indebtedness of the company, to secure control of the stock of companies which have franchises for a new line between Boston and New York.

New York City Railroads.—The Third Avenue Street Railroad, in New York City, carried, in the fiscal year ending Oct. 30, nearly 35,000,000 passengers, and paid 12 per cent. on the capital stock of \$2,000,000 to stockholders. The total receipts for the year were \$1,808,043, and the total expenditures \$1,691,741. This was a marked increase over the net earnings of the road last year. The cable road along Third Avenue will be completed early next summer, and will be in operation in July, displacing the horse cars.

New York, Lake Erie & Western.—The Finance Committee of the directors has decided to recommend the payment of a dividend of three per cent. on the preferred stock. This is the first dividend paid on this stock in 14 years. After paying the dividend it is estimated that there will be a surplus of about \$900,000, equal to 1½ per cent. on the common stock.

New York & New England.—The company makes the following report of earnings for the quarter ending Sept. 30:

	1891.	1890.	Inc.
Gross earnings.....	\$1,701,514	\$1,662,419	\$39,095
Operating expenses.....	1,071,543	1,064,484	7,059
Net earnings.....	\$629,971	\$597,935	\$32,036
Other income.....	1,449	1,264	185
Total income.....	\$631,420	\$600,199	\$31,221
Fixed charges.....	475,520	448,304	27,216
Surplus.....	\$155,891	\$151,895	\$3,996

Northern Pacific.—The gross earnings of the system, including the Wisconsin Central, for September, were \$3,211,278, an increase of \$194,825 as compared with the same month of last year, and net \$1,374,804, an increase of \$30,048. Other income was \$134,063, making total income \$1,508,867, an increase of \$178,507 as compared with last year. Fixed charges were \$1,069,875, an increase of \$31,000, leaving a surplus of \$439,112, as against \$347,205 for the same month last year. For the quarter ending Sept. 30 the company reports:

	1891.	1890.	Inc.
Gross earnings.....	\$3,201,955	\$3,138,451	\$63,504
Oper. expenses.....	4,813,839	4,776,035	37,804
Net earnings.....	\$3,388,116	\$3,362,416	\$25,700
Other income.....	359,883	98,021	261,862
Total income.....	\$3,747,994	\$3,460,437	\$287,557
Charges.....	3,153,076	2,984,236	168,840
Balance.....	\$594,908	\$476,181	\$118,727
On preferred.....	1.62 p. c.	1.29 p. c.	.33 p. c.

The preferred stock outstanding is \$36,042,693, and consolidated bonds, \$40,633,000, being a decrease in preferred stock for the month of \$1,619, and an increase in the five outstanding of \$2,085,000.

North Pacific Coast.—A new issue of bonds for \$412,000 has been authorized by the directors, increasing the total indebtedness of the company to \$1,500,000. The bonds are issued to provide for various improvements on the road, and for the building of a new freight transfer boat, new freight sheds in San Francisco and terminal buildings at Sausalito. A new passenger steel transfer steamer will probably be built.

Oregon Pacific.—In the suit of the State of Oregon against the Willamette Valley & Coast Railroad, leased by this company, to annul the charter of the road, a motion to dismiss on the ground of non-jurisdiction and want of service has been sustained and the case dismissed by the Court at Albany, Nov. 5.

Peoria, Decatur & Evansville.—The annual report for the year ending June 30 shows gross earnings from operation of \$833,467, against \$778,912 last year; operating expenses, \$408,913, against \$416,233; net earnings from operation, \$424,554, against \$362,678; total deductions for fixed charges, taxes, etc., \$377,081, against \$387,919, leaving a deficit of \$13,325, compared with \$25,240 last year. President Mackey says: The physical condition of the road and the condition of its equipment are better than it has ever been. The car trust has been discharged, with the exception of \$24,000, payable in three yearly installments of \$8,000 each. This will place the company in position to rapidly pay off the floating debt that has accumulated for cars, bridges and rails.

Richmond & Danville.—The earnings of this road for the year ending June 30, and of the lines leased for fixed rentals, 751 miles, were published this week in advance of the annual report. The figures are as follows:

Gross income.....	\$5,947,359	I.	\$346,610
Operating expenses.....	3,006,737	D.	101,714
Net earnings.....	\$2,937,622	I.	\$448,361
Fixed charges, sinking funds, and taxes.....	1,725,210	D.	13,178
Surplus.....	\$1,212,403	I.	\$461,539

The auxiliary system, consisting of operating leases and companies controlled, average mileage, 2,014 miles shows:

Gross earnings.....	\$6,376,575	I.	\$544,045
Operating expenses.....	1,310,397	I.	305,648
Net earnings.....	\$2,066,178	I.	\$338,397
Fixed charges.....	1,954,471	I.	39,950
Surplus.....	\$111,707	I.	\$298,447
Total surplus over operating expenses and all charges of the R. & D. system exclusive of the Georgia Pacific.....	\$1,324,110	I.	\$759,980
Georgia Pacific:			
Gross earnings.....	\$1,889,315	I.	\$126,377
Operating expenses.....	1,902,132	I.	354,701
Deficit.....	\$12,817	I.	\$222,324
Fixed charges and taxes.....	867,580	I.	136,105
Total deficit (Georgia Pacific).....	\$880,397	I.	\$364,429

President John H. Inman said this week: "The floating debt of the company, which is about \$3,650,000, is being carried without any trouble by myself and others. Five hundred thousand dollars of it has been placed at 6 per cent. for one year. It is an obligation which will be paid off by degrees from the sale of securities. The East Tennessee floating debt of about \$1,400,000 is being taken care of by President Thomas."

Southern Pacific.—Arrangements have been made with the banking firm of Speyer & Co., of New York, for extending the California & Oregon Railroad six per cent. bonds maturing Jan. 1, 1892. There will be cancelled by the sinking fund \$1,500,000, leaving \$4,358,000 to be extended to Jan. 1, 1918, the bonds to bear five per cent. interest.

The officers say that the company has never been so well prepared to fight the snows of the Sierra Nevada mountains as it will be this winter. The roadbed over the mountains is in good condition. Much money has been spent in rebuilding two miles of snowshed and in putting the old sheds in repair. Since the hard fight of two years ago the company has purchased two more rotary snow plows. The equipment consists of four rotary plows, 10 push plows, a dozen or more engine plows for use in light snow, and several cars for cutting out flangeway after the plows have cleared the track.

Tuckahoe & Cape May City.—P. P. Baker, Receiver for the company, has secured an injunction from Chancellor McGill, of New Jersey, restraining Edward Wood who claims to be the President of this company, and the Farmers' Loan & Trust Co. from issuing bonds to the value of \$400,000, for which Mr. Wood gave that corporation a mortgage. In the bill the Receiver alleges that the Philadelphia & Seashore Company unlawfully appropriated \$80,000 of the money to defray the expenses of constructing the Tuckahoe & Cape May road, and in lieu of that amount the company accepted 1,000 shares of the capital stock of the Tuckahoe & Cape May railroad.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Nov. 11, 1891.
The meeting of the Columbian Passenger Committee last week developed numerous questions of difference, and adjournment was taken to January, the temporary organization being continued meanwhile.

The Western Freight Association, in session this week, is considering a docket containing 96 subjects.

The Chicago, Rock Island & Pacific has put in force demurrage rules at all stations not now governed by the rules of the Car Service Association.

Indications are that the investigation made here of alleged violations of the interstate commerce law, which were suspended after the Counselman case went to the United States Supreme Court on appeal, is to be resumed, and it is said that subpoenas have been issued against several freight agents and others. The case against several employees of Swift & Co. who declined to testify, on the ground that they might incriminate themselves by so doing, and which was continued at the time, will also come up again.

The grain movement has begun to be more active, and considerable wheat was taken by lake last week at four cents a bushel to Buffalo. Rates from Duluth by lake have also advanced to 7 cents, and all the vessels available will be occupied until the close of the season at high rates.

The ever recurring question of relative rates on salt west of Chicago has again been passed upon by the Commissioners of the Western Traffic Association. In August last they considered an application made by the Burlington for a reduction of the rate from Chicago,

and in a decision which was published in these columns Aug. 14 they reviewed the situation at length, stating as their opinion that if an equalization was to be made it should properly be brought about by an advance in rates from Kansas to Omaha and Nebraska City. The Burlington then endeavored to secure this through the Trans-Missouri Association, and failing appealed again to the Commissioners, asking for an advance on barrel salt from Kansas points to Nebraska stations of 2 cents per 100 lbs., and on bulk salt of 4 cents per 100 lbs., which would have the effect of making the rates on both kinds of salt higher from Kansas than from Chicago to those points. The Commissioners have decided this by advancing rates on bulk salt from Kansas points 2 cents per 100 lbs., in order to equalize them with Chicago rates, but denying the application to advance Kansas rates above Chicago. The rate on barrel salt was already the same. At the same time the Commissioners decide an application for a reduction in rates from Kansas points to Mississippi River points and Chicago by declining to authorize the reduction to Chicago on the ground that no through rate can properly be established to Chicago which would be of benefit to Kansas shippers; they, however, authorize a through rate of 18 cents per 100 lbs. to Mississippi River points, Ft. Madison to St. Louis, inclusive, this rate to be a maximum for interior points in Missouri on the same lines for the purpose of allowing the Kansas lines to compete with eastern lines in Missouri east of the Missouri River line. The present through rate is 23½ cents to St. Louis, made up of the sums of the locals via Kansas City. The changes are to be made effective at a date to be fixed by the Chairman of the Trans-Missouri Association, and it is understood that Nov. 16 has been agreed upon for this purpose. But some officers have already expressed marked dissatisfaction with the decisions, and there is no telling how long it will be before a renewal of the disturbance.

Traffic Notes.

The Southern Pacific recently took a car of Chinese laborers from San Francisco to New Orleans in bond. The passengers were bound for Cuba.

The Railroad Commissioners of California have issued an order reducing the tariff on live stock on the Folsom Division of the Southern Pacific 36 per cent.

The Philadelphia & Reading is shipping 1,000 tons of anthracite coal daily to East St. Louis via Harrisburg, the Western Maryland and the Baltimore & Ohio roads.

The recent reduction of passenger fares between Pittsburgh and Chicago is said to be working much disturbance in a large number of other rates in that immediate territory.

The rival bridge companies of St. Louis have come to an agreement concerning freight tariffs, so that the cut rates which have been in force for a few weeks have been abandoned.

The Southern Railway & Steamship Association has made official announcement of the usual half rates for exhibits shipped to the World's Fair to be held at Chicago in 1893, and the tariff goes into effect Dec. 1 next.

The Queen & Crescent has issued a circular similar to that of the Louisville & Nashville, announcing its readiness to pay commissions on ticket sales. It is said that it applies only to points west of the Trunk Line territory.

The trial of the traffic officers indicted for violation of the Interstate Commerce law, whose names were published last week, seems to be still postponed, but it is reported that two more officers have been indicted, Messrs. Eugene Field and F. W. Fowkes, of the Philadelphia & Reading.

Freight rates between Boston and St. Paul via the Canadian Pacific Dispatch and Canada Atlantic line in connection with the Soo line have been advanced as follows:

	1.	2.	3.	4.	5.	6.
New rates.....	\$1.05	\$0.91	\$0.70	\$0.49	\$0.42	\$0.35
Present rates.....	.51	.45	.35	.25	.25	.25

The Texas Railroad Commissioners have issued an order (the occasion being the refusal of the Gulf, Colorado & Santa Fe to accept a car of coal from a connecting line) requiring every road to receive loaded cars from connecting lines. The wording of the order is not very clear, but it seems to aim at compelling the reasonable interchange of bulk freight without the assessment of any extra charges.

The Chicago & Grand Trunk, the Baltimore & Ohio Southwestern and the Ohio & Mississippi, which had withdrawn from the eastbound freight committee, have been induced to return. This was brought about at a meeting of the trunk lines in New York last week, and it is said that all eastbound freight rates will be restored (no definite evidence has been published that they needed restoring), but Chicago dispatches indicate that the absorption of switching charges at Chicago, first started by the Chicago & Grand Trunk, is still continued by that road and by other roads on business which is competitive with the Grand Trunk.

Eastbound Shipments.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Nov. 7 amounted to 58,265 tons, against 59,701 tons during the preceding week, a decrease of 1,436 tons, and against 66,634 tons during the corresponding week of 1890, a decrease of 8,369 tons. The proportions carried by each road were:

	Wk. to Nov. 7.		Wk. to Oct. 31.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	6,441	11.1	7,241	12.1
Wabash.....	5,062	8.7	4,476	7.5
Lake Shore & Michigan South.....	3,895	6.7	8,974	15.0
Pitts., Ft. Wayne & Chicago.....	6,680	11.5	8,021	13.5
Pitts., Cin., Chicago & St. L.....	7,901	13.0	7,932	13.3
Baltimore & Ohio.....	3,760	6.4	3,944	6.6
Chicago & Grand Trunk.....	5,202	8.9	4,900	8.2
New York, Chic. & St. Louis.....	6,740	11.6	7,454	12.5
Chicago & Erie.....	7,794	13.4	6,730	11.3
Total.....	58,265	100.0	59,701	100.0

Of the above shipments 1,983 tons were flour, 21,605 tons grain, 1,780 tons millstuffs, 4,422 tons cured meats, 8,557 tons dressed beef, 2,300 tons hides and 5,482 tons lumber. The three Vanderbilt lines carried 38.1 per cent. of all the business, while the two Pennsylvania lines carried but 24.5 per cent. The lake lines carried 71,492 tons, against 67,598 tons during the preceding week, an increase of 3,894 tons.